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NOTES AND NEWS.

Corn Smut.—According to Dietrich (*Pharm. Zeit.*), the amount of alkaloids in Secale cornutum is somewhat higher than is given frequently in the text-books. Five samples yielded between 0·155 and 0·340 per cent. of alkaloids.

Balsam of Saó Thomé.—According to Moeller (*Ber. d. D. Pharm. Ges.*, 1898, p. 21) the tree which yields this balsam is one of the Burseraceæ, *Santiriopsis balsamifera*, Engl. It attains a height of 15 to 18 metres, and from it flows spontaneously a balsamic resin of reputed healing properties.

Poisoning by Copaiba.—A case is reported by W. H. Thompson (*Brit. Med. Jour.*), of a man aged twenty-seven, who had been taking the balsam for about three weeks. The face and whole body were covered with reddish patches. The temperature was increased, the pulse reduced. The urine did not show any indications of sugar or albumen. The medicine was discontinued and the patient recovered.

Microbes.—A scientist, looking for microbes, says there are absolutely none on the Swiss mountains at an altitude of 2,000 feet. Here is the place for the purity party; and scaremongers who are forever horrifying the public with the dismal fear of microbes; they would have to take their supply with them, most of which are useful to man. It is pleasing to observe that the microbe does not give himself lofty airs, but as a fellow-creature comes down to our level and dwells cheerily in our midst.—*Meehans' Monthly, from Revue Scientifique.*

Export of Arsenic.—The first quarter of the year 1898, presents some new features in exports from Liege, according to Consul Gilbert of that place. In 1895 arsenic was exported to the United States to the value of $19,998.77. In 1896 the aggregate of such exports was $18,051.77. In the first two quarters of the year 1897 no arsenic was invoiced at this Consulate, but during the last two quarters $29,225.14 worth of arsenic was forwarded to the United States. During the first quarter of 1898 the declared value of white arsenic at the Consulate was $15,961.23.—*Consular Reports*, June, 1898.

Chicago Retail Druggists' Association.—A special Committee on National Organization has issued a circular to retail druggists and their organizations in the United States, for the purpose of holding a delegate convention in St. Louis, October 17, 1898, out of which it is hoped a vigorous, centralized influence for the improvement and advancement of the commercial interests of the retail trade may be created. The Committee, of which William A. Dyche is Chairman, urges upon the druggists of the country an active and earnest participation in making this movement unqualifiedly successful.

Goat Milk Cure in France.—Consul-general Gowdy reports in Consular Reports (June, 1898): "I cannot discover that goat's milk is used for clinical purposes in France. It is, however, sometimes given to sickly children, when it is found that the milk of cows and the various prepared milks do not agree with them. Goat's milk is very rich in cream and nutritious substances and there is a popular belief that it is a useful article of diet in pulmonic and anemic complaints. It is served at the domiciles from troops of goats which are milked

on the spot, as it is believed that, to be efficacious, it must be drunk fresh from the animal.

Dr. William Osler.—A perfect deluge of deserved honors seems at present to have fallen to the lot of Dr. William Osler, of Baltimore, Md. No medical name is more frequently mentioned with favor at home or abroad than his, and no one has done, or is doing, more to merit such pleasant recognition. As a thinker, medical author, scientific observer and teacher, he has few peers and no superiors. It is only a few weeks since his name was mentioned in connection with membership in the Royal Society of Great Britain; then we learned that he had become Dean of the Medical Department of Johns Hopkins University; now we hear he is offered the chair in the University of Pennsylvania made vacant by the death of Dr. Pepper; and a despatch from Edinburgh, Scotland, lately related that the university of that city had conferred upon him the degree of Doctor of Laws. In his case, at least, we have evidence of the old saying that "it never rains but it pours."—*Am. Med.-Surg. Bulletin.*

Burdock as a Vegetable.—What is even regarded as a vile weed can, with a little stretch of imagination, be turned into an ornamental plant or delicious vegetable. This is especially the case with the common Burdock, *Lappa major.* Schoolboys all know it from gathering the burs and compressing them into a ball, they being held together by the curved points of the floral involucre. This is all they know about it. It is difficult to see anything more to be despised in the Burdock leaf than in the leaf of the rhubarb. It appears that it is largely used in China for food. But it is stated that, if the stalks be cut down before the flowers expand and then be boiled, the taste is relished equally with asparagus. The leaves, when young, are boiled and eaten as we eat spinach. In Japan, it is in universal use. Thousands of acres are devoted to its culture. But in this case, the root is the object. It requires deep soil to get the roots to the best advantage. The common name, in China, is Gobbo —a name, however, which need not replace our common one of Burdock.—*Meehans' Monthly.*

Rhodinol.—Bertram and Gildemeister state in the *Ber. d. D. Chem. Ges.*, 1898, that Poleck has for some time past reproached them for having fixed on the use of the name geraniol for the fluid alcoholic constituent of rose oil, which they termed rhodinol. The difference of the results of Eckart and other chemists (Markownikoff, Barbier and others) induced Bertram and Gildemeister to investigate the question, and they soon found that Eckart's "rhodinol" was a mixture. From this mixture they isolated a primary alcohol, and found it identical with that obtained from Turkish geranium oil by Jacobson, in 1870, and which possessed the formula $C_{10}H_{18}O$. This geraniol was described in the usual text-books, and Semmler's fine work on the constitution of these alcohols was already published, so that geraniol was necessarily the name applied to the pure isolated alcohol from rose oil. The more recent work of Tiemann and Schmidt, and of Barbier and Bonveault demonstrated the existence of a second alcohol in the alcoholic constituents of rose oil, which Tiemann and Schmidt showed was identical with Dodge's citronellol. Eckart's rhodinol is a mixture of about 70 per cent. of geraniol, 20 per cent. of citronellol, and 10 per cent. of non-alcoholic constituents, and there is no

question as to the real identity of the old "rhodinol" with pure geraniol.—*Brit. and Col. Drug.*, 1898, p. 561.

A Preparation of Koumys may be made, according to the *Dietetic and Hygienic Gazette* for August, as follows: Fill a quart champagne bottle to the neck with pure cow's milk; add two tablespoonfuls of white sugar, first dissolving it in a little water by the aid of heat; add also a quarter of a two-cent cake of yeast. Then securely fasten the cork in the bottle and shake the mixture well; place it in a room having a temperature of from 70° to 80° F. for six hours and finally in an ice-box for about twelve hours. It is then ready for use and may be taken in quantities varying with the requirements of the stomach and general condition of the patient. In preparing koumys it is well to make sure that the milk is pure, that the bottle is sound and the yeast is fresh. The bottle should be opened with great care on account of the effervescent properties of the mixture, and the latter should be discarded and not drunk at all if there is any curdle or thickened masses resembling cheese, as these indicate that the fermentation has been prolonged beyond the proper time. It should be prepared as required for use. The virtue of koumys resides in the fact that it nourishes, refreshes and stimulates, with no subsequent reaction from its effects. Koumys contains some alcohol, with fat, casein, lactic acid and carbonic acid gas. The cost is about fifteen cents per quart, including the bottle.—*The Medical Age*, 1898, p. 540.

Alcoholic Ferments in Nature.—In an investigation on the occurrence of alcoholic ferments in nature and their transportation, A. Berlese (Abs. in *Centralbl. Bakt. u. Par.*, 1897, p. 592) reports the results of investigations of soil from vineyards and from neighboring woods; bark from grapevines and from trees; leaves, flowers, fruit, etc., of the grape and other plants; insects, small animals and the air, for the presence of the ferments so necessary to wine making. The organisms of alcoholic fermentation were quite commonly found, although their occurrence was noticed at different times for different hosts. In April and June, *Saccharomyces apiculatus*, *S. ellipsoideus*, *S. pasteurianus*, forms of Torulopsis, *Mucor dematium*, etc., were found in the vineyard and wood soil, occurring at depths of 10 to 15 cm. in the vineyard and 4 to 36 cm. in the woods. Investigations showed their presence on the bark of oak and olive trees and elsewhere. None were found on the young grapes nor their peduncles in June, nor were any observed in the air during April or May, but in June and July *S. apiculatus* was found in the air.

Various insects were found to play a very important part in the distribution of the organisms. In general, it is claimed that the alcoholic ferments are carried to the grapes by ants, flies and gnats; they can pass uninjured through the digestive canal of the diptera. They are very active in the intestines of the diptera, the temperature being suited to their development.—*Expt. Sta. Rec.*, 1898, p. 1028.

Cicuta vagans, which grows in the low pasture lands of Oregon, has been found to poison cattle in late winter and early spring. According to U. P. Hedrick (*Oregon Sta. Bull.*, 46, p. 12, pls. 4) not less than 100 cattle in various parts of the State were poisoned last spring by this plant. In an experiment

in which the bulb was cut into small pieces and fed, along with carrots cut in the same way, to a two-year-old heifer at 8 o'clock A.M., death resulted one and a half hours later. Upon post-mortem examination, pieces of the root were found in the rumen and in the second stomach. The lungs were highly congested, but otherwise nothing abnormal was noted. On the following day an experiment with a calf was made at 9.15 A.M., and an attempt made to counteract the effects of the poison by giving an ounce of turpentine in a quart of milk. The calf recovered its feet and tried to walk. Soon there were indications of spasms, and the dose of turpentine and milk was repeated, when the calf stood up until 11.30 A.M., then it went down as before. Aconite and milk were then given, and also a hypodermic injection of nitroglycerine, but the animal died at 11.45 A.M. From the beginning of the experiment there was a decided rise in temperature, the highest being 106¼° F.

Similar experiments were made later in the season (May), and it was learned that much larger amounts of the bulbs could then be consumed without serious effects. Hence the author concludes that cattle are likely to be poisoned only from the first of January to the middle of May. The simple remedies, such as old bacon grease, flour and milk, recommended by stockmen in milder cases, the author thinks may be of some value, but that they will be unavailing with an animal that has swallowed even a very small quantity of the bulb when the poison is virulent. The best remedies are eradicating the plant from pastures or keeping cattle from lands where it grows.—*Expt. Sta. Rec.*, 1898, p. 892.

POISON IVY—RHUS TOXICODENDRON.—In the spring is the time for people to be poisoned by this plant; any one may handle it with impunity at any other time. Just when the new growth is beginning and the sap is running riot through its system, buds bursting, with free growth all along the line, it is at this time that the effluvia of the past year is pouring out into the atmosphere from its every pore through branch and leaf. One may see a silvery sheen on its leaves in the bright sunshine. Touch it not at this time. It does not poison all. I am not subject to it at any time. I would not dare to pull the leaves, bruise them and smear them on my face, in bravado as I have seen children do in years gone by, for I feel certain that it would poison me; but otherwise I handle it, work amongst it at all seasons of the year and receive no harm. There are immense quantities of the vine in this country. Nearly every tree in the woods has a plant or two clinging to it and the fences are loaded with it. I have met with men who have declared to me, that the Boston Ivy and Virginia Creeper, *Ampelopsis quinquefolia*, would poison them just as easily and as quickly as the *R. Toxicodendron* and that they dare not go near either of them in the spring. But I have always looked upon this last experience as a case of mistaken identity. The two vines generally grow together, are seen clinging to the same trees and the two plants are much alike when denuded of their foliage. As a cure for the poison, Nightshade—*Solanum nigrum*—is used; its leaves bruised, mixed with cream as an emollient; also Healall, *Brunella vulgaris*. Both are used in outward applications. These are the old-time remedies. Doctors must have better methods now. The Nightshade is poisonous (said to be) and used as a poison to correct another poison.

In this part of the world the chief complaint of rhus poisoning comes from colored leaf gathering in the fall.—F. K. STEELE, in *Meehans' Monthly*.

NOTES AND NEWS.

Guaiacum of lower grade has been offered at the drug auctions of London mixed with the seeds of *Anacardium occidentale.—Chem. and Drug.*, 1898, p. 253.

Coley's Fluid is the name given to the mixed toxins which are being used by Dr. Coley, of New York, as an injection in inoperable sarcoma, with considerable success.—*Ibid.*, p. 347.

Cod Liver Oil of good quality is demanded by the customers of the retail druggist. The Lofoten cod liver oil is palatable, and its consumption in the United States is steadily increasing.

The Ovoid Cardamom is the fruit of *Amomum medicine* Low., and is a native of Southwestern Kwangsi, as well as of Tonquin. The centres of export by the West River are Nan-ning and Po-sê.—*Pharm., Jour.*, 1898, 226.

Gas Pipes out of Paper are being made in England. These are made from cellulose paper and coated with asphalt. They are said to withstand a high pressure and to be less affected by temperature and not affected by electrical currents.

Seedless Raisins.—In California there were experiments in stoning raisins so as to have them as free from seeds as the ordinary currant. Success has followed, till now seedless raisins are becoming an important item among the fruit industries of California.—*Meehans' Monthly.*

Fuller's Earth in California.—An immense bed, apparently inexhaustible, of fuller's earth has been found in San Bernardino County, Cal. The earth is considered at least equal, and possibly superior, to that imported from Great Britain.—*Chem. and Drug.*, 1898, p. 337.

Agar-Agar as an Ointment Base.—Gallois (*Bull. gén. de Therap.*) recommends the use of agar-agar jelly as an ointment base. Small portions of this rubbed on the affected area quickly dry, giving a closely adherent film. It possesses the great advantage over gelatin that in drying on the skin it does not contract.

The Cultivation of the Nutmeg Tree in Ceylon is undertaken very tardily. The yearly exports from that island amount to only about 4,000 to 7,000 pounds. It is now reported that a crop has been gathered in the lower country districts of Kurunegala and Kelain Valley within five years, being at least five to ten years earlier than the time usually required for these trees to bear. —*Chem. and Drug.*, 1898, p. 360.

To Destroy Ants in Lawns.—The following recommended formula for the destruction of ants is given in *Meehans' Monthly* in response to the inquiry of a subscriber: Mix one tablespoonful of bisulphide of carbon in two or three gallons of water. Pour this into holes six inches deep and twelve inches apart, filling in the holes immediately after this has been done. The fumes penetrate the soil and destroy the ants.

Quinoral is a neutral solution of quinine, soluble in water and alcohol, and said to be free from the effects on the heart caused by chloral and quinine.

Bacteriological experiments showed that with quinoral bacteria were more rapidly killed than with sublimate. It is employed in doses of 0·05 to 1·0 gramme; it acts as a hypnotic, especially in delirium tremens in larger doses. —*Zeitsch. d. Allg. Oest. Apoth. Ver.*, 1898, p 754.

Parasitism.—Ribbert compares neoplasms to parasites, finding strong analogy in the growth of the former, their independent character, and in the manner in which metasis develops. Tumors, according to him, always grow through a proliferation of their own cells and displace and invade the neighboring structures without transforming them into neoplastic tissue.—*Univ. Med. Mag.*, 1898, p. 554; from *Deutsche Med. Wochenschr.*, March 17, 1898.

Bacteria in Holy Water.—A continental bacteriologist has found in the holy water in use in one of the most popular churches of Sassari not only staphylococci and streptococci, but also the bacillus of diphtheria and colon-bacilli, which frequently produce appendicitis. The presence of the diphtheria bacillus is supposed to be due to the custom of the worshippers touching their lips as well as other parts of the face with the consecrated water.—*Chem. and Drug.*, 1898, p. 337.

The Toxic Ptomaines of Preserved Meat, when found in hams, game pies, etc., are due, according to Van Ermenglin (*Jour. Pharm. Chem.*, 1898, p. 88), to the presence of a specific organism, *Bacillus bolulinus*. The soluble toxin (boluline) is extremely potent: $\frac{1}{1000}$ part of a milligramme killed a rabbit in twenty-four hours. Fortunately, however, this ptomaine is destroyed at a temperature of 60°–70° C., and the bacillus which produces it at 85° C., so that thorough cooking will remove all dangers in the case of salted or smoked meats. —*Pharm. Jour.*, 1898, p. 217.

Doctors Dispensing.—The medical syndicate of Ronbaix has addressed a circular letter (*Chem. and Drug.*, 1898, p. 148) to the new Chamber of Deputies in which they ask the Deputies, when discussing the new Pharmacy Bill, to introduce a clause specifying that the holder of a double diploma must decide which profession he will exercise. It is pointed out that where medicine is prescribed and dispensed by the same person, no written prescription is necessary, and in a poisoning case it would be very difficult to get at the real facts. Again in many cases the pharmacist, by pointing out a slip of the pen of the doctor, may avoid fatal consequences.

Birch Leaves as a Diuretic.—Huchard confirms the statement of Winternitz that a decoction of birch leaves acts as a useful diuretic. In order to render the resinous matter soluble, Moreau recommends the use of a little sodium bicarbonate. The decoction is made thus: From 10 to 15 grammes of the leaves are boiled in 1,000 c.c. of water, then cooled to 30° or 40° C. and 1 gramme sodium bicarbonate is added. Instead of this decoction, an extract, made by percolation with alcohol from the leaves gathered from the flowering tree, is given in pills in a daily dose of 1·6 to 2·4 grammes.—*Pharm. Jour.*, 1898, p. 237; from *Rép. de Pharm.*, X, 24, after *Jour. des Pract.*

Gonococcus Culture and Toxin.—A. Wasserman has directed his attention to a study of the toxic effects of this micro-organism. The gonococcus is pathogenic for mice, etc., but does not cause infections, only an intoxication. The

poison—*gonotoxin*—is contained in the bodies of the bacteria and not in the culture medium. Injected subcutaneously into human beings the toxin produces a painful induration, with slight rise of temperature, malaise and joint pains, all symptoms disappearing in two days. Immunity could not be produced either in man or in animal.—*Univ. Med. Mag.*, 1898, p. 567; from *Zeitschr. f. Hygiene und Infectionskrank.*, April, 1898.

Cultivation of Henbane and other herbs has been carried on successfully by George Allen & Co., of Ampthill, Bedfordshire, England. This firm has had many years' experience in the growth and culture of medicinal herbs, and Lehn & Fink are the sole agents for the United States. Their preparations, particularly of belladonna, digitalis, conium, hyoscyamus, stramonium, scoparius, etc.,

Crop of Henbane, second year biennial plant.

according to the *Chemist and Druggist*, represent excellent preparations from drugs which exhibit full care in harvesting and drying. The illustration represents a crop of henbane of this firm. They grow or collect all those medicinal British plants which are required for the preparation of green and other extracts, juices, liquors, confections, etc.

Immunity to Viper Poison.—An extraordinary immunization to snake-bite is reported by Phisalin (*The Therapist*, 1898, p. 142) by the use of *cholesterin extracted from gall-stones.* Vegetable cholesterin extracted from the common carrot had previously been demonstrated to possess similar properties. Tyrosin has lately been tried for viper poison with much success. *Vegetable tyrosin* abounds in the dahlia, and Phisalin found that by injecting a juice from the tubercles of the dahlia he imparted all the immunity conferred by tyrosin. As this quantity of the dahlia juice would contain but little tyrosin, he concludes that some other immunizing principle is contained in it. This

is said to be the first known example of a vegetable juice conferring immunity against venom.

Pa-Chioh is the Chinese name for Star aniseed, signifying "eight horns or corners," from the shape of the fruit. The tree which produces this fruit, according to A. Hosie, occupies a comparatively small area, being confined to Tonquin and the southwest of Kwangsi. The bulk of the star aniseed trade has hitherto passed through the port of Pakhoi, and in 1896 Pakhoi exported 6,691 piculs of the value of 113,817 Haikwan taels. This, as well as the oil extracted from the seeds (2,053 piculs valued at 410,692 Haikwan taels) was sent to Hong Kong, while 69 peculs of oil, of the value of 15,552 Haikwan taels, passed Lungchow for Tonquin. It is stated that, owing to the destructive method of collecting the fruit, there is a good crop only once in three years. Complaints have been made that the oil is adulterated with kerosene.—*Pharm. Jour.*, 1898, p. 226.

The Cassia Producing Districts of China are situated in the southern border lands of Kwangtung and Kwangsi provinces, in the south of the West River. The market town of Ta-wu, in the Pinguan district is the great centre of the cassia trade, where 50,000 to 60,000 piculs are annually disposed of. It is exported, packed in matting, by junk to Canton, where there is a powerful cassia ring, which has an arrangement with the native custom house and likin offices, and virtually controls the whole trade of Kwangtung and Kwangsi. The total export of cassia, including cassia lignea, buds, twigs, twig-bark and broken cassia, from the two provinces through Canton in 1896 amounted to 102,810 piculs, valued at 590,798 Haikwan taels; of so-called cinnamon, 99 piculs, valued at 4,801 Haikwan taels were also exported, as well as 398 piculs of leaf oil of the value of 56,484 Haikwan taels, making a total of cassia and cassia products of 653,083 Haikwan taels. China is reported to consume very much more than she exports, so that the total value of the cassia trade must be very considerable.—*Ibid.*, 226.

The Relation of the Taste of Acids to their Degree of Dissociation.—Theodore William Richards (*Am. Chem. Jour.*, **20**, 121–126) finds that he can just detect, by tasting, the acidity of a nearly one-thousandth normal hydrochloric acid solution, and can distinguish weak solutions differing from one another in concentration by 25 per cent.; and he shows that tenth-normal acid can be titrated with alkali with an error of less than 1 per cent., using the sense of taste as an indicator of neutrality. The sour taste of different acids was not found to be proportional to their degree of dissociation; for example, a 0·001 normal hydrochloric acid had a taste like that of an acetic acid solution three times as strong, although the concentration of the hydrogen ions in the former solution is about five times as great as in the latter solution. It was further found that, in accordance with the laws of mass-action, sodium acetate greatly diminished the sour taste of acetic acid, though not as much as the theory requires, while potassium chloride has no influence on that of hydrochloric acid.—*Journal of the American Chemical Society*, May, 1898.

LITERATURE.

The Price-List of Parke Davis & Co. for 1898 contains useful information on many of the newer drugs and remedies. The table of synonyms will be found particularly helpful to all retail pharmacists.

NOTES AND NEWS.

Turpentine Vapor.—A fire was occasioned on the premises of a dealer in chemicals (*Chem. and Drug.*, 1898, p. 622) through an assistant going down the cellar with a naked light, which came into contact with the vapor of turpentine stored there. In a few minutes the whole house was in flames. Damage estimated at 25,000 *f.* resulted.

Preventive of Rust on Metal Work.—Lard 125 parts, camphor 20 parts are melted together and a little graphite added. The objects are dressed with this paste, which is removed after twenty-four hours.—*Chem. News*, 1898, 183.

Students' Insurance.—The University of Heidelberg has announced (*West. Drug.*) an innovation in the shape of accident insurance providing for all students attending its physical and chemical laboratories. While the University pays the premium, a small extra charge is exacted from each student.

Sadtler's Reducing Agent.—A slightly acid bath of hydrogen peroxide is used as a reducing agent for chrome tanned skins.—*Leather Manufact.*, 1898, p. 101.

Sterilized Water.—Bizzozero maintains that the taste frequently complained of in boiled water is really caused by the kettle and can scarcely be due to the absence of CO_2 or dissolved air, of which water from wells of great depth often contains very little.—*Pharm. Jour.*, 1898, 118; from *Practitioner*, LXI, 63.

Black Wax.—E. H. Blitz has examined a sample of black wax from the West Indies, and finds that the coloration is due to the pollen grains contained in the wax.—*Pharm. Zeit.*, 1898, 404.

Mushrooms as Food.—The report of the U. S. Department of Agriculture (Farmer's Bulletin, No. 79) compares the composition of mushrooms with that of other articles of food, and shows that edible fungi do not possess a high food value.

An Honor.—Dr. A. B. Griffiths has been elected an honorary member of the Medical and Surgical Society of Rio Janeiro, Brazil, in recognition of his researches in the ptomaines.—*Chem. News*, 1898, p. 144.

Essence of Mandarins.—J. Flatan and H. Labbé (*Bull. Soc. Chem. de Paris*) have found 98 per cent. of limonene in this essence, identical with that found in the essence of Portugal; a trace of citral, and about 1 per cent. of the same ether insoluble in alcohol were also present.—*Ibid.*, p. 160.

The Drug Market.—Geo. L. Muth, Chairman of the Committee on Drug Market of National Wholesale Druggists' Association, reported, among other things, that the importation of certain drugs has been very heavy. Quinine and its salts, 4,372,477 ounces, against 2,696,492 ounces previous year. Balsam copaiba increased 64,000 pounds in imports, while opium imports for fiscal year 1896 to 1897, 1,072,914 pounds, same 1897 to 1898, only 123,845 pounds, a big decrease, 949,069 pounds. The supply of many indigenous drugs was heavy, owing to big prices; others, where prices have been so very small, are not coming to market.

Acid, Boracic.—A slight advance during the year. There is very little news in regard to the California product, which promised so well a few years ago.

Acid, Tartaric.—This is usually a very fluctuating article in the drug trade; but, for past year, has been very steady.

Alcohol, Grain.—Again in the combine of the great Whisky Trust, and, of course, higher prices.

Alcohol, Wood.—Declined only for a short time. Sales are pretty large, it being freely used in the arts.

Arrow Root, Bermuda.—The true article quoted 42 to 45 cents in kegs; it is getting very scarce; the regular stock Bermuda, 25 to 30 cents in kegs. St. Vincent's, owing to tariff, is selling 7 to 9 cents, and American, 5½ to 7 cents.

Balsam, Copaiba.—As usual, this drug moves in many ways, having a big advance at the outbreak of our war with Spain. The imports from June, 1897, to June 30, 1898, were 196,571 pounds, an increase of 64,000 pounds over previous year.

Balsam, Canada Fir.—A slight advance only during the year.

Balsam, Peru.—Much more fluctuating than usual.

Balsam, Tolu.—Low price now ruling.

Bark, Cascara Sagrada.—The price has been very unsteady for new bark, 3 to 6¾ cents, and for old bark 8 to 10 cents; sales have been very large.

Bark, Cinchona.—Calisaya selling all the year from 15 to 22 cents, as to test.

Bark, Cinchona.—Red selling 12 to 18 cents, as to test. The imports for first seven months of this year nearly 600,000 pounds against 400,000 same time 1897.

Berries, Saw Palmetto.—This new drug may go to high figures; they nearly all come from Florida, and people, on account of the great number of soldiers being in the State, have more profitable employment, and will not gather them. Selling in October, 1897, at 6 cents; now (September, 1898), 10 to 12 cents.

Buds, Balm of Gilead.—Very fluctuating: selling 1897, October, 30 cents; 1898, January, 35 cents; March, 40 cents; May, 24 cents; July, 22 cents; September, 26 cents; October, 28 cents.

Beans, Tonka, Angostura.—Have declined very much; 1897, October, $1.60; 1898, March, $1.45 to $1.50; July, $1.25 to $1.30; September, $1.15 to $1.25 per pound, and Para Beans now selling 12 to 15 cents per pound; Surinam, 45 to 50 cents.

Beans, Vanilla, Mexican.—Have declined; 1897, $10.00 to $13.00 per pound; now (1898) selling $7.75 to $13.00 per pound, and cuts $7.25 to $7.50.

Beans, Vanilla, Bourbon.—Are much lower, quoted $4.50 to $7.00 per pound, as to quality.

Camphor.—For many years this has not been so steady as the past year, and sales have been very large.

Camphor, Japanese.—Has been steady.

Cantharides, Chinese.—Have advanced.

Cantharides, Russian.—Declined during the year.

Ergot.—Has only advanced slightly past year; 1897, German selling 14 cents; now (1898) at 18 cents per pound; and the Spanish, 1897, 18 to 20 cents; in September, 1898, selling 23 to 25 cents.

Flowers, Arnica.—Prices are very low, selling all the year from 5½ to 7 cents, as to quality.

Flowers, Chamomile, Belgian (Roman).—Have advanced.

Flowers, Chamomile, German.—A sharp advance only lately; 1897, October 16 to 20 cents; 1898, September, 22 to 28, and 35 cents for some very choice.

Flowers, Lavender.—A new demand has increased the sales, and now selling ordinary 3 to 4 cents, and select from 9 to 12 cents.

Glycerin.—Has been rather more regular in price.

Green Soap, German.—Government officials discovered that there is a duty of 15 cents per pound on this, and price was advanced very much, selling, 1897, October, 6 to 6½ cents; January, 22 to 24 cents. It is now being made in this country, and selling from 5 to 8 cents, as to quality; this is quotation in kegs.

Gum Arabic.—Has declined during the year; selling October, 1897, firsts, 55 cents; seconds, 34 cents; thirds, 27 cents; sorts, 17 cents; now, 1898, September, 48 to 50 cents; seconds, 32 cents; thirds, 27 cents, and sorts 16 to 17 cents.

Gum Aloes, Barbadoes True.—19 to 21 cents, and so-called in gourds, 5 to 6 cents.

Gum Aloes, Cape.—5 to 6 cents all the year.

Gum Aloes, Curacoa.—2½ to 3½ cents. This now has a large sale, said to contain the largest percentage of aloin of all the gums.

Gum Aloes, Socotrine.—20 to 24 cents, as to quality.

Leaves, Cocoa, Huanacoa.—1897, September, 15 to 17 cents; December, 21 to 24 cents; now selling at 20 cents.

Leaves, Cocoa, Truxillo.—1897, September, 10½ to 12 cents; November, 15 to 18 cents; February, 1898, 12 cents; September, 10 cents.

Oil, Aniseed.—Changes in price like a Chinese puzzle; 1897, October, $2.10; November, $1.85; December, $1.70; 1898, April, $1.60; May, $1.55; June, $1.75; September, $1.67.

Oil, Neroli Petali.—Perfumers must have found something new, as sales of this oil are growing less. Price has been $27 per pound, declining to $25 at this writing.

Oil, Cloves.—Advanced very much.

Oil, Cubeb.—Demand growing less; prices very low.

Opium.—Prices have advanced very much. We give the figures, average for each month: 1897, October, $2.60; November, $2.60 to $2.85; December, $2.60; 1898, January, $2.85; February, $2.90 to $3; March, $3 to $3.10; April, $3.10 to $3.25; May, $3.25 to $3.65; June, $3.45 to $3.65; July, $3.60 to $3.80; August, $3.65 to $3.75; September, $3.60 to $3.65. Imports for year, June 30, 1897,

to June 30, 1898, 123,845 pounds. The previous year the import was 1,072,914 pounds, a decrease in the past year of 949,069 pounds.

Paris, Green.—The sales of this are getting less every year.

Root, Calamus, Bleached.—It is said that the shrinkage of this root is very great, and prices are according to amount of moisture; selling now, 1898, September, from 28 to 35 cents.

Root, Ipecac.—This has reached the highest figure in the memory of many of us; selling in 1897, October, $1.65; November, $1.75; 1898, January, $2; March, $1.90; May, $2.20; June, $2.35; September, $2.45 to $2.60.

Root, Lady Slipper.—Another uncertainty as to price. Very little gathered this year.

Root, Mayapple.—Where this all is gathered is too much for your committee to say; believed by some to amount to nearly 2,000,000 pounds; prices have not been so high.

Root, Orris.—This has again declined. Florentine, from 12 cents in 1897, to 9½ and 10 cents in September, 1898, and Verona, from 9 cents in 1897, to 7 and 8 cents in September, 1898.

Root, Pink.—Only small decline; selling now, 17 to 20 cents, as to quality.

Root, Rhubarb.—This has been regular at the advance price of 1897; Canton, 30 to 40 cents, and Shensi, 50 to 65 cents.

Root, Sarsaparilla, Honduras.—Selling all the year, 28 to 34 cents.

Root, Sarsaparilla, Mexican.—Selling 5½ to 6½ cents.

Root, Senega.—Only the usual small changes.

Root, Squill.—Sales getting smaller; either new remedies for the babies or no babies for the squills. Price, 4 cents, all year.

Saffron, American.—Very low all the year; 12 cents all the year; now, September, 1898, selling at 11 cents.

Saffron, Valencia.—Selling 1897, September, $10.50; declining 1898, March, $9, and May, $10.50 to $11; September, $10 per pound.

Sulphur.—The war helped many of us to make very large profits on sulphur, being contraband of war, expected scarcity; many manufacturers bought heavy and at high figures, selling up to May 1, 1898, at 1½ to 1¾ cents, less 10 per cent. for quantity; when in one day it advanced to 6 and 7 cents net; May 7th dropped to 3½ and 4 cents; July, 3 and 3¼ cents; August, 2½ to 2¾ cents; September, 2 to 2⅜ cents, by discount of 5 to 10 per cent., as to quantity.

LITERATURE.

Pharmaceutical Catalogue. Frederick Stearns & Co., Detroit, Mich.

This catalogue contains a marginal index with copious notes of reference, and a large amount of general information pertaining to pharmacy that makes it of value as a ready reference book. It also contains doses and medical properties of nearly all the preparations listed in it. There is a very exhaustive index of botanical and common names, a number of tables of useful information, and a scheme for urinalysis. We understand that the books are now ready for general distribution, and that the publishers will send a copy to any established pharmacist on receipt of request.

THE AMERICAN
JOURNAL OF PHARMACY

JANUARY, 1898.

DR. PETER SMITH AND HIS DISPENSATORY.[1]

By John Uri Lloyd, Ph.M., Ph.D.

Close following the frontiersmen, whose footprints were scarcely rubbed out, and whose rifles had not yet been silenced in the territory embracing the Ohio Valley, came a band of men who cleared away the forest and founded their homes among the stumps. The subject of this sketch may be numbered among these people. He was a typical Puritan, an educated, stern man, of indomitable will, and religious to the utmost degree.

The end of the War of the Revolution had been consummated before the Indian had departed from the Miami lands, where this man lived. John Filson tramped from Lexington to the Ohio River, laid out the village of Losantiville, afterward Cincinnati, and, venturing too far from the fort, left his bones somewhere among the adjacent hills. This happened several years after the subject of this sketch was married.[2] David Schœpf, the talented scientist, that

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[1] Read at the December meeting of the Cincinnati Section of the American Chemical Society.

[2] John Filson was a surveyor and school teacher. September 6, 1788, he published, in connection with Mathias Denman and R. Patterson, in the *Kentucky Gazette*, of Lexington, Ky., a call for men to make a road to the mouth of the Licking, where Judge Symmes expected to lay out a town opposite the mouth of the Licking. Filson was made surveyor for the proposed village, and coined for it the name L-os-anti-ville, making the name from ville (town), anti (opposite), os (mouth), and L (Licking). The place went by the name *Losantiville* until January 2, 1790, when Governor St. Clair changed it to *Cincinnati*. John Filson did not live to complete this work. In company with Symmes and

energetic Hessian, who, after the surrender of the British, took his pack on his back and tramped over our land in search of American medicinal plants, had not yet written his *Materia Medica Americana*, which is the first systematic publication concerning the American Materia Medica.[1]

B. S. Barton, of the University of Pennsylvania, who, in 1798, contributed the first study of American drugs, from an educational institution,[2] and Samuel Thomson,[3] the combative champion of lobelia, who fought the medical profession and introduced the Thomsonian method of medication, were contemporaneous with Peter Smith. C. S. R. Rafinesque, that picturesque, gifted, erratic, enthusiastic scholar, who devoted his life to science, in his guileless confidence had not yet been misled and ridiculed by Audubon, the brilliant bird painter. The great ornithologist had not yet played his cruel practical jokes on his confiding guest when Peter Smith trod the Kentucky path that Rafinesque and Daniel Vaughn followed afterwards towards their miserable graves.[4]

But enough of this dissertation concerning the men who, in or near the day of Peter Smith, helped to make American Materia Medica history; their trials and privations cannot more than be touched upon in this paper; the subject is Dr. Smith.

Coming into the Ohio Valley from the South that he hated because of its slavery, preaching the Word of God and practising

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others, he started on an exploring expedition up the Miami River, wandered away from the party and was never heard of again. Probably the Indians were responsible for his death.

This historical note concerning a man who took no part in medicine is apparently out of place. But the author fails to find his record in biographical works where it ought to be in place, and therefore ventures to thrust a word into print concerning the man who made for General Washington the first scientific description of Kentucky, who wrote the first history of Kentucky, who surveyed the site where now stands Cincinnati, and who gave to this city a picturesque, original name, that was rudely brushed out of existence by the unfortunate General St. Clair, Governor of the Northwest Territory.

[1] "Materia Medica Americana," 1787.

[2] "Collections for an Essay towards a Materia Medica of the United States," by Benjamin Smith Barton, M.D., 1798.

[3] See "A Narrative of the Life and Medical Discoveries of Samuel Thomson," 1822.

[4] "The Life and Writings of Rafinesque." Prepared for the Filson Club, Louisville, Ky., and read at its meeting, Monday, April 2, 1894. By Richard Ellsworth Call, M.A., M.Sc., M.D.

medicine, Peter Smith, the representative of a class of men who sought neither fame nor gold, and who feared no privation, made his mark and passed away.

"Peter Smith, the Indian Herb Doctor." That name was familiar during the writer's boyhood in Kentucky. The name lingers yet about Western domestic medicine, and is occasionally seen in orthodox medical print. Rafinesque cited Peter Smith as one of the authorities consulted in the formation of his Materia Medica, but Smith's book was lost to sight. Tradition also told of a book by Peter Smith, but no such book was anywhere to be found. Second-hand booksellers, old men and women throughout the "Miami Country," old physicians' libraries were appealed to in vain. Neither is a copy of this book to be found in the Surgeon General's library. The name of the man alone remained, the book that he wrote had vanished. Then at last the writer gave up the search in despair.

Last summer, by invitation of Mr. Le Roy Brooks, the day was spent with the Toledo Club at Middle Bass Island, Lake Erie. General J. Warren Keifer, in speaking about old books, chanced to mention Peter Smith's Dispensatory, a copy of which he possessed. The lost book was found, and, in addition, the history of its author was recovered, for Peter Smith was the father of General Keifer's mother. Added interest accrued from the fact that it was learned that the field of Dr. Smith's operations about Cincinnati was near the spot where these lines are penned, the old Duck Creek church, a pioneer monument in the history of the Ohio Baptists, in which he officiated, being within a few moments' walk of the home of the writer.

HISTORY OF PETER SMITH.[1]

Dr. Peter Smith, a former resident of Old Columbia, now a part of Cincinnati, had, in pioneer days, some celebrity as a physician in the "Miami Country." He was a son of Dr. Hezekiah Smith, of the "Jerseys," "*a home old man*, or *Indian doctor*." Peter was born in Wales, February 6, 1753, from whence this branch of the Smith family came. He was also a relative of Hezekiah Smith, D.D., of Haverhill, Mass. Peter Smith was educated at Princeton, and was married in New Jersey to Catherine Stout, December 23, 1776. He seems to have early, under his father, given some attention to medi-

[1] Credit is due General Keifer for the facts that gave this information.—L.

cine, and became familiar with the works of Dr. Rush, Dr. Brown, and other writers of his day on "physic," as well as with the works of Culpepper. He also, during his life, acquired much information from physicians whom he met in New Jersey, Pennsylvania, Virginia, North and South Carolina, Georgia, Kentucky and Ohio. He called himself an "Indian doctor," because, as he said, he relied in his practice much on herbs, roots and other remedies known to the Indians, though he did not confine himself to botanical remedies. He seems to have been an original investigator, availing himself of all opportunities within his reach for acquiring knowledge, especially acquainting himself with domestic and tried Indian remedies, roots, herbs, etc.

Starting from New Jersey about the year 1780, he commenced his wandering, emigrating life with his wife and "some" small children. He lingered for a time in Virginia, then in the Carolinas, and "settled" in Georgia. He sought out people from whom he could gather knowledge "of the theory and practice of medicine," and preached the gospel, possibly in an itinerant way. He was a devout Baptist of the old school. A strong anti-slavery man, even in that early day, he could not be content with his Georgia home, as he put it, "with its many scorpions and slaves." Accordingly, he took his family on horseback; little children, twin babes among them, carried in baskets suitable for the purpose, hung to the horns of the saddle ridden by his wife, and thus, without roads to travel, crossed mountains, rivers and creeks. The wilderness was not free from danger from Indians, but he traversed the woods from Georgia through Tennessee to Kentucky, intending there to abide. But, finding that Kentucky had also become a slave State, the dogmatic old man and his family bid good-by to Kentucky. He left that State with a parting shot to the effect that it was the home of "head-ticks and slavery," and emigrated to Ohio, settling on Duck Creek, near the Columbia Old Baptist Church, now adjacent to Norwood village, and near the limits of Cincinnati, reaching there about 1794.

He became, with his family, a member of the Duck Creek congregation, and frequently preached there and at other frontier places, still pursuing the occupation of farming and the practice of medicine. In 1804 he again took to the wilderness with his entire family, then numbering twelve children, born in the "Jerseys and

on the line of his march through the wilderness, the States and the Territories." He finally settled on a small, poor farm on Donnel's Creek, in the midst of rich ones, where he died December 31, 1816. It seems from his book (p. 14), published while he resided at his last home, that he did not personally cease his wanderings and search for medical knowledge, as he states that he was in Philadelphia, July 4, 1811, where he made observations as to the effect of hot and of cold air upon the human system. It is certain that he not only taught to the end in the pulpit, but ministered as a physician to his neighbors and friends, often going long distances from home for the purpose. He concluded, near the end of his long and varied experiences, that: "Men have contrived to break all God's appointments but this: '*It is appointed for all men once to die.*'"

Peter Smith, preacher, farmer, physician, pioneer, aggressive abolitionist before Wendell Phillips or William Lloyd Garrison were born, is buried in a neglected graveyard near Donnelsville, Clark County, O. No photograph or other likeness remains to revive the features of this picturesque personage.

Such is the life-record of this man, who, so far as the writer can determine, published the first western Work on materia medica.

On the following page is a fac-simile title-page of this unique book.

Next follows the rare and lengthy copyright, not of the United States, but of the "District of Ohio." Succeeding the copyright, which covers an entire page, follows the "Advertisement," in which Dr. Smith states that "he puts the price of one dollar on this book of advice, well knowing that seventy-five cents would be enough;" but he adds that "those who do not choose to allow him twenty-five cents for his advice may desist from the purchase." In the preface that follows, words are used in true Oliver Cromwell style, no equivocating, no evasion. An axe is an axe and a spade is a spade. He placed himself directly in the path of the medical profession, an extract from the preface being illustrative of how he censured himself for following the advice of the learned Dr. Rush:

> "While I lived in Georgia, a very great attention was paid by almost everybody there to calomel and jalap, for after Dr. Rush's publications relative to the yellow fever, there was calomel and jalap prescribed for everything, so that the poor old tartar-emetic lay dead in the shops, and I, like other fools, gave it liberally."

After the eight-page preface comes the "Introduction," in which,

speaking of the "Doctrine of Respiration," Dr. Smith records an Indian legend that should not be lost:

"An Indian, it is storied, when asked what he thought was the reason of the ebbing and flowing of the tide, made answer: 'You know there is a great deal of odds between a big creature and a little one; a horse draws his breath a great deal slower than a mouse; the world is a big creature—he draws his breath only twice in the day and night; that makes the tide.'"

THE

INDIAN DOCTOR'S DISPENSATORY,

BEING

FATHER SMITH'S ADVICE

RESPECTING

DISEASES AND THEIR CURE;

CONSISTING OF PRESCRIPTIONS FOR

MANY COMPLAINTS:

AND A DESCRIPTION OF MEDICINES,

SIMPLE AND COMPOUND,

SHOWING THEIR VIRTUES AND HOW TO APPLY THEM

DESIGNED FOR THE BENEFIT OF HIS CHILDREN, HIS FRIENDS AND THE PUBLIC, BUT MORE ESPECIALLY THE CITIZENS OF THE WESTERN PARTS OF THE UNITED STATES OF AMERICA.

BY PETER SMITH,
OF THE MIAMI COUNTRY.

Men seldom have wit enough to prize and take care of their health until they lose it—And Doctors often know not how to get their bread deservedly, until they have no teeth to chew it.

CINCINNATI.
PRINTED BY BROWNE AND LOOKER,
FOR THE AUTHOR.
1813.

But it is not of disease expressions and their cure that we, as pharmacists, are chiefly concerned. We find, in the remedies of this old

"Indian doctor," much to interest the historian in the line of American medicine, much information that has been used over and again, and which stands in our works to-day uncredited to its originator, who charged twenty-five cents more than his book was worth for the information his father and himself had gathered from the Indians and others.

Thus in his Materia Medica department, he speaks of "Home Ipecacuanha," a term lost to us now, but which he appropriately used for Indian physic. The absence of balances for weighing led him to instruct the reader to "take a pugil" of it, which is to be "made into a decoction of half a gill," which is to be given, one-third of it at a time, every ten minutes, "until it does work, either up or down."

It is to be regretted that Dr. Smith neglected the use of botanical names. His plants are all employed under common names, but he describes the appearance and habitat of each specimen so carefully as to enable the experienced reader to identify most of them. Rafinesque, who credits Dr. Smith, objects to his common names, which, however, are very interesting in connection with the text. The pains he takes to credit authorities from whom he obtained information is very refreshing, the relationship of their names to the substances used being familiar to us to-day in connection with many drugs.

A few examples of lost terms and others still in use may be cited:

Brinton's or Culver's Root.
Miami Columbo (American Columbo) Root.
The Nine-bark Root.
The Square stalk Root.
The Corn Snake Root.
The Horse Balm.
The Mountain Mint.
The Sore Throat or Blueberry Root.
The Devil's Nip.
The Devil's Bit.
The Backache Root, etc.

Following the description and uses of simples comes recipes for diseases, in which the originator of each compound is conscientiously credited. We find a few of these names familiar yet, *e. g.*, green ointment and ointment of red lead. Concerning this latter, he refers

to an interesting revolutionary incident where it had been used with good result on a soldier "who had been wounded at the Germantown battle, 1777, in the Revolutionary War. One of his legs had been broken and shattered while he was one of the forlorn party sent to tear down the fence and palings about Chew's house."

Passing to some of his remedies, we are reminded of the animal drugs of mediæval times; *e.g.*, a dead toad is recommended as an application to a wen, and Smith's remedy for toothache—well it would credit the animal extract men, past or present. But this subject must be touched lightly; for are not many members of the medical profession seemingly gravitating again towards the "moss that grows on a dead man's skull" of European mediæval medicine? Dr. Smith seems to have anticipated the cold water curers (hydropaths), but he recorded his views in language that demonstrates that he stood close to some of the sanative surgeons of to-day. He says:

"COLD WATER APPLICATIONS

"I reckon among the choicest of my discoveries.

"The following I recommend:

"When the accident of a bruise, piercing of a nail, a cut, a broken bone, an eye knocked out and put in again, etc., takes place, immerse the part in cold water as quick as possible, and then dip a large, soft linen cloth into cold water and apply it, and keep out the air. This cloth should be kept close; aid this by dropping cold water upon it for fifteen minutes, and continue it close for twelve hours. The inflammation by this means will be kept back, and the cure by anything else will be almost forestalled; and then a bruise, a strain or broken bone, will scarcely swell at all; and a like application to a burn will have a similar effect. In about fifteen minutes the first pain will be over, and the future ease will be steadfast.

"I have tried the foregoing application of cold water, with full demonstrations, for forty years past."

And it needs but little imagination to credit this stern man with a poetic spirit, for he pathetically laments (p. vi) the fact that through his own fault, the "Leotrill" was lost. So earnest is he concerning this precious "Leotrill," met as he journeyed from Virginia to Georgia, that he states that he sometimes thinks of travelling the weary way over again, hoping yet to obtain this "Leotrill."

And that his observing eye caught yet finer lines, is evidenced by the fact that he pointed out an "insect" theory of disease, and placed himself (pp. xiv, xv) in the ranks of the microbe theorists of

to-day by asserting, in an extended argument, that the "plague, yellow fever and other bilious and contagious complaints" were caused by "invisible insects;" and in accordance with his methods the Doctor takes pains to credit another for the suggestion.

But enough has been said concerning this upright, picturesque character—too much some persons may say. Still, the writer feels that his pen has not taken too much space in placing in print these notes concerning the history of this man whose name has been nearly lost, whose face has left no print, but who wrote the first Materia Medica "Dispensatory" published in the West.

LIQUID BENZOIN FOR BENZOINATING LARD.

By Richard M. Shoemaker.

It is an open secret that the gum benzoin of commerce is largely adulterated, the percentage of impurities ranging, in my experience, in what is called very good commercial gum, from 5 to 20 per cent. Apart, then, from the practicability of the present official method of benzoinating lard, which is open to question, it is plain that benzoinating lard with the benzoin of commerce must give rise to variable products.

To overcome this variability, I have been using, for some time, a prepared liquid for the purpose of benzoinating lard. The formula for its preparation is as follows:

Benzoin	20 grammes.
Ether	40 cubic centimetres.
Castor oil, a sufficient quantity to make	15 grammes.

Macerate the benzoin in the ether for twelve hours; filter with proper precautions to avoid loss of solvent; dissolve the castor oil in the filtrate, and distil off the ether carefully.

The oleaginous product is of deep amber color, and contains the benzoic acid and volatile principles of the gum. The residue left after the ether treatment is destitute of odor or taste. The benzoinated liquid can be made and sold commercially for 75 cents a pound. In case of special demand for the liquid, and the making of large quantities, its cost would doubtless be reduced.

I send for examination a sample of the liquid made from Sumatra benzoin imported from Ascheen, which latter left, after the ether treatment, a residue of 13 per cent., mainly bark. The bark, I presume, is that of Styrax benzoin, Dryander.

I send, also, a sample of Siam gum, which contains only 4 per cent. of impurities, mainly bark. The liquid benzoin made from this gum is lighter in color, and has a more delicate aroma, than that made from the Sumatra variety. But the high cost of the Siam gum militates against its general use. A sample of the Siam benzoinated oil is submitted.

To make benzoinated lard, I use the following formula:

	Grammes.
Liquid benzoin	15
White wax	20
Dehydrated lard	965

Melt the lard and the wax by heating with steam heat to eliminate water; add the liquid benzoin, and stir until cold. During warm weather it will doubtless be advisable to replace a part (5 per cent.) of the lard with white wax, as directed by the U. S. Pharmacopœia in its process for making "Adeps Benzoinatus."

Benzoinated lard thus made can be prepared in a very short time—far less than the time required in making the official product. It is a yellowish white solid, possessing in full the characteristic odor of the volatile proximate principles of benzoin. It can be made and sold for 18 cents a pound, and less for larger quantities.

FOURTH AND RACE STREETS, PHILADELPHIA, December, 1897.

A CONTRIBUTION TO THE KNOWLEDGE OF THE GUM FROM THE OIL TREE.

BY CHARLES W. DIRMITT.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 172.

This substance is obtained by tapping the trunk of Prioria copaifera. Grisebach describes the tree in his *Flora of the British West Indies* as a new genus, and named it after Dr. Alexander Prior, who possessed a very large private collection of Jamaica plants, constantly referred to in the *Flora*.

The tree attains the height of 80 feet, and measures about 20 feet in circumference near the base. It is known as the "oil tree" in the Bath district, and has been described by Mr. William Fawcett in the *Bulletin of the Botanical Department, Jamaica*, Vol. IV, page 77.

At the request of Mr. Fawcett, who supplied the material, Prof. Henry Trimble made a preliminary examination of it in regard to its solubilities and general chemical properties, chiefly with a view of determining whether the so-called gum resembled balsam of copaiba sufficiently to permit it being used medicinally, or, if of no value in that respect, whether it could be used by unprincipled exporters and handlers of the last-named substance as an adulterant thereof.

The result of this investigation showed that the gum is entirely too dissimilar to the balsam of copaiba to be used for adulterating it, and that it is probably inert medicinally.

The results of Professor Trimble's work were published in the body of Mr. Fawcett's article in the place cited; but as that publication may be inaccessible to many pharmacists and chemists, it is believed that the report could be advantageously incorporated with the present paper.

The sample, as received from Mr. Fawcett, was a thick adhesive liquid, resembling copaiba in appearance. Upon standing, it separated into two layers. When thoroughly mixed it became turbid, on account of a greenish substance which it held in suspension. On the subsidence of this greenish substance, the upper layer, which constituted by far the greater part of the sample, became clear and of a brownish-yellow color. The material had no pronounced odor, but it imparted a fatty taste at first, which gradually became acid. It did not behave like a gum resin when masticated. In thin layers it was transparent, with a pale straw-yellow color. On exposure to air it dried superficially, with a decrease of adhesiveness.

On carefully igniting a portion of the sample, it yielded 0·075 per cent. of ash, consisting of calcium carbonate and sulphate, with traces of the corresponding magnesium and potassium salts. The combustion was attended with the production of a very sooty flame.

The original material was found to be readily soluble in absolute alcohol, ether, chloroform, carbon disulphide, petroleum ether, amyl acetate, ethyl acetate, methyl acetate, amyl alcohol, benzol, toluol, nitro-benzol, aniline, acetone, phenol, oil turpentine, cottonseed oil (therefore, probably, fixed oils in general), glacial acetic acid and oil of camphor.

Alcohol of the specific gravity 0·820 did not completely dissolve it. The portion left undissolved appeared to be the substance causing the turbidity of the sample. Absolute alcohol and chloroform dissolved this residue. The solution in alcohol of the specific gravity 0·820 had a brownish-green fluorescence. Water, glycerin, 36 per cent. acetic acid, and 85 per cent. phosphoric acid, failed to dissolve the original material.

Aqueous solutions of sodium and potassium hydrates and ammonia water produced white insoluble mixtures. Potassium hydrate in alcohol dissolved it with the exception of a few white flakes. Magnesium oxide and water formed

a solid mass, as did also potassium hydrate when it was fused and the material added to it; the resulting mass showed no tendency to liquefy by further heating, nor would it dissolve in water.

The original material seemed to be separated from this by treating with diluted acid in excess, shaking with ether, separating and evaporating the ethereal layer.

About 60 grammes of the original material were mixed with water in a flask, the latter attached to a condenser, and heat applied; the water distilled over, leaving the material in the flask apparently unchanged. No oily layer separated from the distillate, thereby indicating the absence of volatile oil, and determining at once the important distinction of this substance from copaiba balsam.

The distillate was practically clear and colorless, neutral to litmus paper, and gave no color with ferric chloride. An aromatic odor was exhaled during the distillation, and was, to a less degree, noticeable in the distillate. The water remaining in the flask with the material had the same properties as the distillate, and had dissolved nothing. Heat was then further applied to the flask and its contents until all the water was removed. The temperature was then increased and the material, by a decomposition similar to that known as "cracking" in the distillation of petroleum, distilled until about 90 per cent. had passed into the receiver. The residue then began to coke and emit smoky vapors. The black, tarry residue solidified on cooling. The last portion of the distillate had a reddish color, and a strong fluorescence, similar to that seen in paraffin oils—the odor of this portion was distinctly that of petroleum. The first distillates were yellow and had an aromatic odor; these were mixed and redistilled. The distillation began at about 150° C.; about three-fourths of the mixture passed over between that temperature and 360° C. When this point was reached the residue in the flask had a reddish color, a petroleum-like odor and fluorescence like the previously-described fraction. Both processes were evidently accompanied by destructive distillation.

The specific gravity of the original material was slightly higher than water, although it floated on the latter liquid, owing, no doubt, to occluded air. No nitrogen was found to be present.

The substance is either a resinous body, very poor in oxygen, or else a hydrocarbon, or a mixture of several of them. Its physical properties, no doubt, suggest a resemblance to copaiba balsam, and therefore the specific name of the tree; but in composition and chemical properties it bears no relation to either copaiba balsam or gurjun balsam.

Its behavior under high temperature indicated some relation to fixed oils. (See Sadtler on the "Destructive Distillation of Linseed Oil," AMERICAN JOURNAL OF PHARMACY, 1896, p. 485.) It is probably medicinally inert.

In considering the peculiar behavior of the gum when heated, it is of interest to learn, through Mr. Fawcett, that the trees when tapped at certain seasons of the year yield a copious supply of the gum, and that this liquid was formerly used by the negroes for burning in lamps; when so burned it is said to emit a very disagreeable odor.

Professor Trimble kindly supplied the author with the remainder of sample of gum upon which he worked, for the purpose of making a fractional distillation, with a view of determining the composition of the several fractions which had been noticed in the previous distillation.

Before beginning a fractional distillation, the gum was filtered through absorbent cotton in a hot filtration funnel. The filtration proceeded slowly, and it was noticed that the filtrate was much clearer than the original sample, which phenomenon was probably due to the loss of the small quantity of adhering water through vaporization; at the same time the suspended greenish substance was removed by the filtering medium.

This greenish substance was likely sap which had oozed out from the tree with the gum.

The clear filtered liquid was found to have a specific gravity of 1·008 at 15° C.

Metallic potassium immersed in the gum remained bright for some days, then gradually oxidized and disappeared in the gum without altering the transparency, color or consistency of the liquid to any appreciable extent. The product of this solution behaved with water in the same way as Professor Trimble found aqueous solutions of sodium and potassium hydrates to act on the original material.

In order to make a fractional distillation of the gum, 125 grammes of the original material were placed in a flask attached to a vacuum condenser and heat applied. The vacuum gauge showed a pressure of 254 millimetres. As the temperature of the gum was increased, the peculiar cracking sound, recorded by the previous investigator, was observed, and a few drops of condensed steam collected in the receiver as the heat was gradually increased.

When the liquid had reached the temperature of 240° C., it began to boil, but nothing distilled except the small amount of water.

During this distillation of the water the apparatus was filled with a heavy white vapor, which passed into the aspirating tubes, and condensed therein to oily drops resembling the distillate subsequently gotten from the gum.

A thermometer suspended in the gum showed a temperature of 360° C. At this point a small quantity of distillate had passed over into the condenser, but the temperature of this distillate was but

200° C., clearly showing that decomposition was taking place in the hot substance in the flask.

The heat was continued and the thermometer was allowed to remain in the distilling flask until the temperature of the distillate rose to 360° C. Up to this point only a small amount of the liquid had distilled over, although the atmospheric pressure in the distilling flask was the same as at the beginning of the operation.

After the thermometer had been removed, the pressure within the apparatus was again reduced to one-third, and the distillation continued, this time without any attempt to register the temperatures of the distillates when the partial vacuum was destroyed in order to change the receivers, and another receiver had been attached to the condenser and heat reapplied, it was plain to see that the temporary cooling of the gum had the effect of causing its decomposition into lower boiling substances.

Three other distillates were collected. These varied in color, and apparently in specific gravity, as, when a few drops of one distillate fell into the portion preceding it, the two liquids could be seen upon stirring. The first of these liquids had a pale yellow color; the second a yellow color, the third was more yellow than the second, and the fourth was of a greenish color.

Besides the water, which distilled over when the gum was heated, each of the four fractions which were obtained was mixed with water, and it was noticed that the amount of this seemed to bear a definite relation to the volume of the fraction. All the distillates had odors suggestive of acrolein.

In order to obtain these distillates it was necessary to push the temperature to a point where the residue in the flask was a thick, tarry substance, possessing a petroleum residuum odor. Upon allowing this residue to cool it became solid. This residue constituted 1·89 per cent. of the weight of gum taken.

The first fraction obtained in the above distillation was redistilled under a pressure of 250 millimetres. The distillate obtained from it passed over between 100° C. and 310° C., the temperature rising gradually during the process.

The second, third and fourth fractions were also refractioned, but it was impossible to register the boiling points of the distillates obtained from them, although they were distilled under as little as 200 millimetres to 250 millimetres pressure.

The liquids boiled at

	Temperatures. Initial.	Final.
Distillate I	100° C.	310° C.
" II	150° C.	above 360° C.
" III	150° C.	" "
" IV	180° C.	" "

It was obvious, from the irregular boiling points observed for the fractions, that destructive distillation had taken place during these fractionings of the gum, and, in order to inquire into this matter further, it was decided to take the specific gravity of the several fractions, again refraction them, and take the specific gravity of the distillates thus obtained.

The following table shows the specific gravities of the fractions before their last distillation and after the same, also such temperatures of the distillates as could be registered during the distillation:

	Specific Gravities.		Temperatures.	
	Before Distillation.	After Distillation.	Initial.	Final.
Distillate I	·920	·910	90° C.	260° C.
" II	·942	·913	150° C.	360° C. and higher.
" III	·976	·929	150° C.	360° C. " "
" IV	·946	·931	190° C.	360° C. " "

These were again refractioned under reduced pressure, and their specific gravities and temperatures were again taken when the following variations were found:

	Specific Gravities.		Temperatures.	
	Before Distillation.	After Distillation.	Initial.	Final.
Distillate I	·910	·910	75° C.	240° C.
" II	·913	·910	115° C.	265° C.
" III	·929	·923	100° C.	290° C.
" IV	·931	·915	155° C.	300° C.

Another portion of 125 grammes of the gum was fractionally distilled under ordinary atmospheric pressure, and the four fractions were collected as before. The deportment of the gum under the influence of heat in this case, and the character of the distillates, were very similar to those obtained in the first distillation carried out under reduced pressure.

The distillates were all much thinner in consistency than the original gum; they were also liquid at ordinary temperatures, and possessed considerable odor, while the original material was thick and semi-solid at ordinary temperatures, and almost odorless.

The distillates became more viscous toward the latter part of the distillation; but when they were redistilled several times they lost this property to a considerable degree, as well as the fluorescence which was present in all cases.

The cracking noise which accompanied the heating of the gum, and mentioned by the previous investigator, was observed by the writer both in distilling it under reduced and the ordinary pressure.

The gum did not begin to boil until the temperature of 360° C. was reached, then it began to yield a distillate having a temperature of 215° C., but only 15 c.c. of distillate had collected by the time the temperature of the distilling liquid had attained the temperature of 360° C. The temperature at which the vapor passed over under reduced pressure was 15° less than under ordinary pressure.

The following specific gravities and boiling points of the fractions were found:

	Specific Gravities.	Temperatures. Initial.	Final.
Distillate I	·949	115° C.	above 360° C.
" II	·964	170° C.	" "
" III	·975	above 360° C.	" "
" IV	·947	"	" "

Three successive distillations were made on each of the four distillates; but it was found impossible to get a fraction having a definite boiling point, so they were not further distilled.

At this juncture it was decided to make an ultimate analysis of the fraction which was obtained between 115° C. and 265° C. under reduced pressure of 200 to 250 millimetres. For this purpose the upper layer of the fraction was removed and thoroughly dried with potassium carbonate to remove the adhering water, then decanted and redistilled under ordinary pressure. The distillate so obtained consisted of two layers, the lower of which was water.

This continued behavior of the gum in giving water on distillation therefore precluded the possibility of rectifying the oil after drying it with potassium carbonate, and it therefore became necessary to remove the supernatant layer, allow the water to separate, as nearly as possible, and then take the clear upper layer without rectification for combustion.

Several combustions were made upon this material with varying results that indicated as much as 4 to 5 per cent. of oxygen in the substance.

Considering the fact that it was quite impossible to completely remove the water from the fraction and the fact that some volatile gases were produced in the distillation of the liquids, the results of combustion might be looked upon as indicating a hydrocarbon. This view is strengthened by those combustion results whose carbon and hydrogen figures amounted to over 99 per cent.

Attention was then directed to the original material in order to determine its ultimate composition. As the gum could not be distilled without decomposition, it was necessary to dry it for several days at 110° C., in order to completely expel all adhering moisture.

During this drying the physical properties remained unaffected. Combustions were then made of the thoroughly dried material, with the following results:

	I.	II.	III.	IV.	Average.
Carbon	79·51	79·77	79·91	79·73	79·73
Hydrogen	12·04	12·77	11·29	11·53	11·91
Oxygen	8·45	7·46	8·80	8·74	8·36

These results indicate a substance with the following empirical formula: $C_{24}H_{40}O_2$; the percentage composition of this substance is:

C	79·97
H	11·14
O	8·89
	100·00

On account of the decomposition of the gum when heated, but little was learned, and it would be mere speculation to attempt to classify the gum by the foregoing formula.

Some of the gum upon which these results were obtained was distilled under ordinary pressure in the same manner that some of the undried gum had been treated.

The distillates contained water along with the hydrocarbon-like substance which distilled over.

The white vapors again filled the distilling apparatus, and the acrolein-like odors were again observed.

Combustion of the supernatant layers after drying with potassium carbonate showed increased amounts of carbon and hydrogen over those obtained from the original gum. In fact, the results at this point were practically the same as those obtained from the combustion made on the distillate obtained from the undried oil.

The distillates were tested for acrolein by shaking with water, separating the watery layer, making alkaline with ammonium hydrate, and heating with silver nitrate on a water bath. A reduction of the silver salt took place with the formation of a mirror on the sides of the test tube. The water, which had been agitated with the distillate, was also examined for formic acid by the mercuric chloride test. After keeping the test hot for some time no white precipitate was formed, indicating no reduction of the mercuric compound, and therefore an absence of formic acid.

It is believed, therefore, that acrolein is a product of decomposition of the gum during distillation. And it seems reasonable that the water which collects in the receiver during the distillation is also a product of decomposition.

These points, considered jointly, would seem to indicate some relation between the so-called gum and the higher fatty acids or fats, although the empirical formula found by combustion does not coincide with the general formula of the acids of either the paraffin, olefine, or acetylene series.

If we suppose it to be an acid similar to those just mentioned, the general formula of the class to which it would belong would be

$$C_nH_{2n-8}O_2.$$

The flash point of the gum was found to be 183° C., and its burning point 190° C.

Its iodine value was 46·39, and its saponification equivalent was 15·10.

ON THE ACTION OF SULPHURIC ACID UPON STRYCHNINE IN THE SEPARATION OF THIS ALKALOID FROM ORGANIC MATTER.[1]

BY E. H. S. BAILEY AND WM. LANGE.

In the separation of the alkaloids from organic matter in the ordinary toxicological examinations, it has been found convenient to purify the alkaloid from the last portions of organic matter by evaporation of the partially purified material with a drop or two of strong sulphuric acid, and the question has arisen—to what extent does this operation destroy the alkaloid. The concentrated acid destroys the organic matter, and it would be strange if it did not,

[1] *Kan Univ. Quar.*, Vol. VI, No. 4, Oct., 1897, Series A.

under these conditions, partially destroy the alkaloid, or by hydrolysis or in some other way so change it that its presence could not be discovered by ordinary reagents. The object of these investigations was to determine, if possible, to what extent this process affected the delicacy of the tests for the detection of strychnine.

The method employed for separation of an alkaloid from organic matter is usually that of Stas, modified by later investigators as the conditions of the case may suggest. For the separation of strychnine, the best method has been found to be to acidulate with acetic acid, and digest at a moderate temperature with diluted alcohol. This alcoholic solution is then evaporated and an aqueous solution is obtained, which is made alkaline with caustic potash and shaken with chloroform several times; the chloroform solution is separated, and evaporated to dryness, and the residue, dissolved in a drop of dilute acetic acid, is tested for strychnine by the appropriate reagents. If this residue is still impure, it will become colored when the sulphuric acid is added to it, on account of the decomposition of organic matter, for pure strychnine salts and sulphuric acid give no coloration, or only the very faintest trace of color.

The color tests for strychnine are considered very satisfactory if carefully performed, and in connection with the precipitation by alkaloid reagents and the examination of the crystals by the microscope, and with the physiological test also, they can be depended upon to identify the alkaloid. Our experience has been that the most delicate tests could be made by the use of sulphuric acid and potassium bichromate. In this case the succession of colors, blue, purple and red is very characteristic. The color, with some other oxidizing agent, as manganese dioxide, is frequently of value as a confirmatory test, especially in the presence of other substances, such as caffeine. With this latter reagent the color reactions appear more slowly, but are just as definite finally.

In these experiments the delicacy of the color reaction with sulphuric acid and potassium bichromate was first established. In order to do this, solutions of strychnine of various strengths were prepared by dissolving a known weight of the alkaloid in acetic acid and water. The strength of these solutions varied from 1 grain of strychnine dissolved in 1,000 c.c. of water to 1 part in 1,000,000. One-tenth of a cubic centimetre of the solution, corresponding to one-tenth the weight of strychnine in 1 cubic centimetre, was evaporated to

dryness on a porcelain crucible cover, over a water bath, taking care to have all the strychnine deposited at one point on the cover. This residue was then moistened with 1 drop of concentrated sulphuric acid, and a minute particle of potassium dichromate was drawn through the droplet with a fine glass rod. This gave the characteristic color reaction. Beginning with a concentrated solution of strychnine, the tests were made in solutions of greater dilution till a point was reached at which it was not possible to detect the alkaloid by this test. The microscope was not used in the examination of the color test.

In the second series of tests, after evaporating the solution to dryness on the porcelain cover, it was treated with a drop of concentrated sulphuric acid, and heated for fifteen minutes on the water bath, then the test was made in the usual manner.

In the third series of tests the conditions were such as would prevail in the ordinary course of analysis, when organic matter is present. To each portion, before testing, a measured quantity of extract of beef was added, 25 c.c. of alcohol, and a few drops of acetic acid, and the whole was digested for an hour on a water bath. The mixture was then diluted, filtered, and evaporated to dryness on a water bath, allowed to cool and dissolved in water acidulated with a drop of acetic acid. The solution was made alkaline with potassium hydrate and shaken out twice with chloroform, about 10 c.c. of this solvent being used each time. The mixed chloroform solutions were then evaporated to dryness at 100° and the residue was moistened with a drop of sulphuric acid. This was warmed for fifteen minutes, then dissolved in water made alkaline with potassium hydrate and shaken out three times with chloroform. The mixed chloroform solutions were evaporated to dryness on a water bath, concentrating the residue to a small point on the porcelain surface, and the test was applied as in the preceding cases.

The results of these tests were as follows:

DELICACY OF THE CHEMICAL TESTS.

Fractions of a milligram present in the solution (x = limit, t = test).

	0·1	0·05	0·033	0·025	0·020	0·016	0·011	0·005	0·003	0·0025	0·0020	0·0016	0·0014	0·00125	0·0011	0·001	0·0005	0·00033	0·00025	0·00020
Series I. Tests with the plain solution:	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	x
Series II. Tests with strychnine and sulphuric acid:	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	x				
Series III. Tests with strychnine, sulphuric acid and organic matter:		t	t			x														

These experiments show that, though great care was exercised in the treatment of the residue, the action of the sulphuric acid decreases the delicacy of the reaction, so that although $\frac{25}{1000000}$ of a milligram was detected in the original solution, after heating with sulphuric acid, only $\frac{11}{100000}$ of a milligram was detected. After the treatment with sulphuric acid and the shaking out with chloroform, it was not possible to find the strychnine except in a solution that contained $\frac{2}{100}$ of a milligram. It is evident that the treatment with sulphuric acid does diminish the delicacy, but that is not so large a diminution probably as the process of shaking out with chloroform. Although chloroform is an excellent solvent for strychnine, one part being soluble in eight parts of this menstruum, still so much of the strychnine is still retained in the organic matter that the portion that can be obtained from the chloroform solution is only a fraction of that which was originally present. It is probable that by more perfect extraction with chloroform, a greater quantity of strychnine can be obtained; but the experiments described above are made especially to show what will be the result, if the ordinary methods of extraction are followed.

ON THE USE OF ACETONE AS A SOLVENT IN PREPARING THE OFFICIAL RESINS.

By Edward T. Hahn.

Acetone is a good solvent for many organic substances, and is probably destined to replace alcohol and ether in many analytical and pharmaceutical processes. It is cheaper than either of these solvents. It is much more easily recovered from solutions than is alcohol. The loss through imperfect condensation in recovering it from solutions is less than that experienced with ether, and beside this advantage, acetone is not so inflammable as that very volatile fluid.

A few years ago, Mr. George M. Beringer[1] found that acetone could be satisfactorily used instead of ether for preparing the official oleoresins.

Later, in a paper on the preparation of the oak tannins, Messrs. Trimble and Peacock[2] showed that acetone could be employed to

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[1] American Journal of Pharmacy, 1892; 145.

[2] American Journal of Pharmacy, 1893; 435.

advantage for the extraction of this class of proximate principles.

Prof. S. P. Sadtler[1] has proposed the use of acetone in the technical analysis of asphalt. And C. Kippenberger[2] has employed it as a solvent in volumetric determinations of alkaloids by means of Wagner's reagent.

In the work upon which the present article is based, the author endeavored to gain an idea of the value of acetone as a solvent in preparing some of the official resins. And it has been his especial purpose to compare acetone as a solvent in this connection with official alcohol. To accomplish this end, he extracted a sample of commercial powdered jalap with official alcohol, according to the directions of the United States Pharmacopœia; and, by following the subsequent instructions of that authority in regard to the precipitation and washing of the resin, he obtained a yield of 6·5 per cent. The quantity of powdered jalap operated on was 100 grammes. By substituting acetone for alcohol in the official process, he obtained a yield of 7·5 per cent. when working with 100 grammes of the drug.

Similar experiments with quantities of 100 grammes of powdered podophyllum yielded 4 per cent. of resin when alcohol was used, and 4·5 per cent. when acetone was employed. The foregoing results, therefore, show an increased yield when acetone is used. In extracting the resin from scammony, two lots of 10 grammes each were employed. One of these lots was treated with successive portions of boiling alcohol until exhausted. The other lot was treated in exactly the same manner with boiling acetone until exhausted. In both cases the solution of resin was evaporated to the same bulk and poured into equal quantities of water. The yield of resin was the same with the two solvents. It amounted to less than 60 per cent. for the drug in its original moist condition. After drying the sample of scammony to a constant weight, the yield of resin by the same method was found to be 63 per cent. by both solvents.

There was no marked difference in color between the samples of resin prepared from the same drug with the two solvents. The resins which were prepared by the use of acetone were found to be soluble in alcohol, and the reverse of this was true; those which were extracted with alcohol were soluble in acetone. This matter

[1] 1895, *Journal of the Franklin Institute*, **140**, 383.

[2] 1896, *Ztschr. anal. Chem.*, **35**, 10 and 422.

of solubility clearly indicates a great similarity in the products. It would appear from the results which the author has obtained that acetone might economically and conveniently replace alcohol in the preparation of the three previously named resins.

AN EXAMINATION OF SOME COMMERCIAL POWDERED EXTRACTS OF LICORICE.

By Calvin O. Kinzey.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 173.

The fact is well known that the powdered extract of licorice offered for sale in our markets is adulterated with such materials as starch, pea meal, sugar, etc., to a very large extent, and the extract can be readily adulterated with these materials without causing any very perceptible change in its appearance. It is evident that the evils arising from a practice like this will have a very bad effect on the market, and cause no small amount of loss and annoyance to purchasers.

While the value of extract of licorice depends altogether upon the amount of glycyrrhizin present, there seems to have been no effort made to establish a standard amount of this principle required in a good extract; furthermore, very little seems to have been written on the methods of assaying the extract of licorice for glycyrrhizin; and what has been written is rather vague regarding the solvent employed for dissolving the glycyrrhizin from the extract, and the details of reprecipitating the glycyrrhizin.

The author has lately had several brands of commercial powdered extract of licorice to estimate for glycyrrhizin, and he found himself confronted with the state of affairs already mentioned. Therefore, to estimate the samples, it became necessary to make some preliminary experiments, in order to devise a method that would afford comparative results.

The method which is ordinarily used in the estimation of glycyrrhizin is to exhaust the extract with either boiling water, cold water made alkaline with ammonia water, or with a cold mixture of water and alcohol, made alkaline with ammonia water. The insoluble matter is then filtered off, and the clear filtrate, containing the glycyrrhizin, is precipitated by making it acid, usually with dilute sulphuric acid.

During the course of these experiments, it was found that the method in which the ammoniacal water is used was not practical on account of the starchy materials present closing up the pores of the filter so the liquid could not pass through it. More success was had from the solvent containing alcohol, as the alcohol seemed to coagulate the starch to a sufficient extent to make it possible to filter off the insoluble part of the extract; but even under these conditions it required about twenty hours to effect filtration. An attempt was made to shorten the time required by using a suction pump, but this was found to be impracticable, on account of the filter clogging.

The following solvent for the extraction of the glycyrrhizin was found to give the most satisfactory results:

	c.c.
Official Ammonia Water	40
Official Alcohol	240
Sufficient Water to make a litre.	

METHOD OF ANALYSIS.

Moisture.—A weighed quantity (about 1 gramme) of the extract was put in a porcelain crucible, and dried in an air bath at a temperature between 100° and 110° C. The loss in weight was taken as the amount of moisture present.

Ash.—The residue remaining after treating as above was ignited to low redness over a Bunsen burner, until, on prolonged ignition, the weight remained constant. The residue gave the inorganic matter in the extract.

Insoluble Matter.—One gramme of the extract was carefully weighed, and treated in a beaker with 25 c.c. of the solvent previously mentioned. The mixture was stirred at close intervals during an hour, and then allowed to stand for about twelve hours, so that the insoluble matter could settle out. The supernatant liquid was decanted upon balanced filters, the residue in the beaker treated with 5 c.c. more of the solvent, allowed to settle again, decanted as before, and the insoluble matter transferred to the filter and washed until the washings passed through colorless. The filters and residue were then placed in an air-bath and dried at 100°–110° C.

Glycyrrhizin.—The filtrate from the above was acidified with dilute sulphuric acid, which precipitated the glycyrrhizin as a dark brown scale, which coagulated on standing. The precipitate was

collected on balanced filters, washed with water made slightly acid with acetic acid until all the sulphuric acid was washed out, and then dried in an air bath at 105° C., a higher heat being avoided on account of the liability of decomposing the glycyrrhizin above that point.

Two estimations were made on most of the samples, the figures given in the statement being the average of the two.

Manufacturer.	Brand.	Moisture.	Ash.	Insoluble Matter.	Glycyrrhizin.
1	Spanish . . .	6·52	3·70	36·52	6·40
2	Greek	6·26	8·18	22·06	14·39
2	Spanish . . .	5·00	5·51	25·54	10·75
3	American . . .	5·62	6·79	12·27	7·63
3	Spanish . . .	7·08	6·52	29·20	5·28
4	Spanish	6·96	6·56	20·35	10·41
4	Greek	6·71	7·82	9·65	18·59
5	—	7·96	5·77	15·21	8·90
5	—	8·25	5·54	7·40	27·78
5	—	8·46	4·67	19·41	9·50
5	—	9·19	6·76	11·12	8·94
6	—	5·78	7·49	5·95	11·63

THE CHEMICAL ANALYSIS OF THE GASTRIC CONTENTS.[1]

I. Method of Analysis for Use in Clinical Work.

II. Record of the Analyses of the Gastric Contents of Fifty Healthy Individuals.

BY HENRY F. HEWES, M.D.,

Assistant in Chemistry, Harvard Medical School, Boston.

I. METHOD OF ANALYSIS FOR USE IN CLINICAL WORK.

To the physician who would utilize the investigation of the products of gastric digestion, as an aid to the diagnosis and treatment of his cases, there are two requisites. These requisites are: (1) a reliable method of investigation; (2) a series of results for comparison, obtained by the application of this method to the product of the normal gastric digestion.

The development of a systematic method of investigation is dependent upon the collected knowledge of the subject of gastric

[1]From *Boston Medical and Surgical Journal*, November 25, 1897.

digestion in health and disease. This knowledge is, stated briefly, as follows :

The digestion of food in the stomach occurs through the agency of a mineral acid (hydrochloric acid), a proteolytic ferment (pepsin) and a coagulating ferment (rennin), all produced from the glands of the mucous membrane of the stomach. Under the combined action of these physiological agents the proteid elements of the ingested food are digested.

The secretion of the hydrochloric acid begins immediately upon the ingestion of the food. The secreted acid at once combines with the native proteids of the food, forming acid proteids. It also acts upon the pepsinogen in the gastric glands forming pepsin.[2] The secretion of the acid continues until the affinities of the native proteids for acid being satisfied, a certain amount of superfluous (free) hydrochloric acid obtains in the stomach.

Coincident with the appearance of this free hydrochloric acid, the activity of the pepsin ferment begins.[3] Under the influence of this pepsin in free HCl, the acid proteid products are converted with increased rapidity to albumoses and peptones. The rennin ferment is produced from the beginning of digestion, in part existing preformed in the cell of the mucous membrane, in part being formed by the action of the secreted acid upon the rennet zymogen. Under its influence the casein of food is digested to a coagulated and a soluble proteid.[4]

The products of digestion are in part absorbed, in part expelled in small quantities during the process of digestion. The greater part of the contents is, however, expelled *en masse* into the duodenum at the completion of digestion (Richet and Kühne). Whatever products are absorbed are replaced by water secreted by the stomach.

The mixed contents of the stomach will contain in the earlier stage of digestion :

(1) The elements of the ingested food, proteids, albuminoids, carbohydrates, fats, mineral and organic salts and extractives.

(2) The acid proteids and acid salts, the products of the combination of the secreted hydrochloric acid with the proteids and mineral salts of the food.

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[2] Langley : *Journal of Physiology*, Vol. III and Vol. VII.

[3] Boas : Diagnostik d. Magenkrankheiten, Leipzig, 1890, s. 118.

[4] Hammarsten : Maly's Jahresbericht, Vol. II, p. 118 ; Vol. IV, p. 135 ; Vol. VII, p. 158.

(3) The ferments, pepsin and rennin and the rennet zymogen.

(4) The products of the action of rennin upon casein. The principal proteids present are the native proteids and the acid proteids.

In the later stage of digestion the contents will contain the above substances except the organic salts, and, in addition, free hydrochloric acid and certain organic acids due to the action of the free HCl upon the organic salts of the food.[5]

The principal proteid substances present are albumoses and peptones.[6, 7]

In pathological conditions of the stomach we may find absence or diminution of one or more of the physiological agents of digestion; and, in addition, the presence of certain abnormal substances not produced in the normal organ. These last substances are principally certain organic acids, lactic acid, butyric acid, acetic acid.

These substances are present in the normal contents only in the amount in which they or their salts are contained in the ingested food. In pathological conditions of the stomach they may be produced in considerable amounts as a result of the fermentation of the foods, principally the carbohydrate foods.

The particular fate of the different food elements in the stomach is as follows:

The native proteids are transformed in turn to albuminates, albumoses and peptones.

The albuminoids are, to some extent, digested; to some extent remain unaltered; thus gelatin is transformed to gelato-peptone, keratin is unchanged.[8, 9]

The carbohydrate food is not digested by the agents of gastric digestion. The hydrochloric acid of the gastric juice has the power of inverting cane sugar, but aside from this the gastric secretions exert no influence upon the carbohydrates.[10] A certain amount of amylolytic digestion does, however, occur in the stomach under the influence of the ptyaline of the saliva brought into the stomach with the food. The digestion of cooked starch goes on in

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[5] Richet: Le Suc Gastrique, Paris, 1878. Gamgee: Physiological Chemistry, Vol. II, p. 158.

[6] Boas: *Zeitschr. f. klin. Med.*, B. 12, s. 244.

[7] Cahn: *Zeitschr. f. klin. Med.*, B. 12, s. 34.

[8] Tatarinoff: *Centralbl. f. d. med. Wassenschaft*, No. 16, 1887.

[9] J. de Bary: Hoppe-Seyler's Untersuchung, H. I, p. 75.

[10] Leube: Virchow's Archiv, Bd. 88, s. 222.

the stomach through the influence of this ptyaline until inhibited by the increasing acidity of the contents.[11, 12]

The fats are not digested in the stomach. The proteid envelopes of the fat cells are digested away, allowing the fat globules to run together, and thus preparing the fat for the action of the intestinal digestion.[13]

The duration of digestion in the stomach, the rapidity of the appearance of free hydrochloric acid in the contents, and the quantity of the secretion of the physiological agents necessary for complete digestion are directly dependent upon the quantity and quality of the food.[14]

Thus 100 grammes of raw beef *plus* 300 c.c. of water are digested in two hours.[15] The same amount of beef roasted takes three hours. The duration of the digestion of an Ewald test breakfast (one roll, weight 35 grammes, and 300 c.c. of water) is from two to two and one-half hours. The digestion of a Leube meal (soup, meat and bread) is from six to seven hours.[16]

Free hydrochloric acid appears in the normal stomach from fifteen to twenty minutes after the ingestion of 35 grammes of bread with water; twenty-five to thirty-five minutes after the ingestion of twice this amount (70 grammes); twenty-five to thirty-five minutes after 60 grammes of meat; sixty to ninety minutes after egg albumin; forty-five minutes after a mixed meal of bread, meat and vegetables. The addition of fat to a meal delays the appearance of free HCl. The replacing of a certain amount of meat by a potato delays the appearance of the HCl.

The total amount of the free hydrochloric acid may rise after a light meal (Ewald meal) to 2·2 grammes per mille, after a full meal (Leube) to 3·3 grammes per mille.[17] This maximum mark is

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[11] Ptyaline digests cooked starch to dextrin and maltose at the body temperature in neutral, alkaline or faintly acid solutions. Chittenden: *American Chemical Journal*, Vol. III; Studies from Yale Laboratory of Physiological Chemistry, 1884–85.

[12] The action of ptyaline is inhibited in an acidity of ·14 per cent. free HCl, ·27 per cent. combined HCl. Langley: *Journal of Physiology*, Vol. III.

[13] Cash, Archiv f. Anat. and Physiol., 1880, claims that small quantities of the fats are broken up by the action of the HCl to fatty acids.

[14] Ewald and Boas: Virchow's Archiv, Vol. CI, s. 3 5.

[15] Lassen: *Zeitschrift f. Biologie*, Vol. XIX.

[16] Leube: Deutsches Archiv, Bd. XXXIII.

[17] Ewald: Klinik der Verdauungskrankheiten, Vol. II.

reached from one to one and one-half hours after an Ewald meal, from two to three hours after a Leube meal.

Upon the facts contained in this review of the function of gastric digestion is based the method of investigation. It is clear, from this review, that the important points to be investigated are: The presence and amount of the physiological agents of digestion; the evidence of their action upon the food; and the presence or absence of certain abnormal products. We have found that the time of the appearance of these agents and the amounts of them secreted vary according to the quantity and quality of the food ingested. To judge of the status of these agents in a given case, therefore, we must obtain the contents of the stomach in that case at a given time after a definite meal, subject these contents to a systematic examination, and compare the results of this examination with standard results obtained from an investigation of the contents of the normal stomach in a series of cases under the same conditions.

The first step in the development of the method is the choice of the meal. This test meal should contain the ordinary elements of mixed food, that is, proteids, albuminoids, carbohydrates and fats. It should also contain none, or as small amounts as possible, of those substances the production of which is peculiar to the pathological conditions of the stomach, that is, lactic, butyric and acetic acids.

Of the meals which have been proposed as test meals, we may mention those of Ewald,[18] of Leube and Riegel,[19] of Reichman,[20] of Jaworski,[21] of Klempere,[22] of Boas.[23] Two of these only are in common use for general work, that of Ewald and that of Leube and Riegel.

The Ewald test breakfast consists of one baker's roll, weight about 35 grammes, and 300 c.c. of water, or of tea without milk or sugar. According to König's analysis, such a roll contains 7 per cent. of nitrogen, ½ per cent. of fat, 4 per cent. of sugar, and 52·5 per cent of non-nitrogenous extractive substances, to which 1 per cent. ash must be added.[24]

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[18] Klinik der Verdauungskrankheiten, Vol. II, s. 14.

[19] See below.

[20] Reichman's meal: meat fonder 30 grammes, 1 roll, water 200 c.c., salt 2 grammes.

[21] *Zeitschr. klin. Med.*, Bd. XI, s. 275.

[22] Ewald: *Berl. klin. Woch.*, 1886, No. 3.

[23] *Deutsch. med. Woch.*, No. 39, 1893.

[24] Ewald: *Loc. cit.*

This meal thus contains the various nutritious ingredients, albuminoids, starches, sugars, plant albumins, salts and fat.

The Leube meal consists of 400 grammes of soup, barley or flour soup, 60 grammes scraped beef, 50 grammes of wheat bread, and 200 c.c. of water.

The use of both these meals may be necessary—in some cases one, in some the other, in some both. In a majority of cases, however, but one meal has to be resorted to; and for this general work the Ewald meal is the superior. This superiority of the Ewald meal is based upon the following comparative data:

(1) The Ewald meal contains lactic acid, if at all, in amounts too small to react to the ordinary approved tests.[25] The Leube meal, on the other hand, contains a considerable amount of lactic acid.[26] As the production of lactic acid in the stomach is a symptom of pathological conditions, we have thus, in the presence of this acid after the Ewald meal, positive evidence of abnormal conditions, which evidence cannot be obtained by the use of the Leube meal.

(2) The quantitative results in regard to the amount of the hydrochloric acid secreted and the period of the appearance of the free hydrochloric acid vary within much more extended limits in the normal after a Leube meal than after an Ewald.[27, 28]

The considerable amounts of organic acids and acid salts which may be present in the Leube meal make rough estimations of the hydrochloric acid less reliable and accurate estimations more laborious than with the Ewald meal, with its insignificant amount of these substances.

A fourth advantage of the Ewald meal lies in the fact that it can be taken by patients with disordered digestive functions with much less difficulty than the Leube.

It is true that the Ewald meal is not as strong a test of the diges-

[25] The finding of lactic acid in the normal contents, as reported in many cases by old methods, is of no account, as the methods have been proven inaccurate; Rosenheim: *Zeit. klin. Med.*, Bd. XXVIII, 1895.

De Jong: Archiv. Verdauungskrankheiten, Bd. II, H. 1.

Langruth: Archiv. Verdauungskrankheiten, Bd. I, s. 305.

[26] Langruth: *Loc. cit.*

[27] Rosenheim: Pathologie u. Therapie—Speiserohre in Magenskrankheiten.

[28] Einhorn: *Berlin. klin. Woch.*, 1888, No. 32. In a series of investigations of the normal digestion with both the Ewald and Leube meals, found the results obtained by the Ewald meal much more constant.

tive function as the Leube. A patient might have sufficient digestive capacity to completely digest an Ewald meal, and yet not sufficient to digest the ordinary mixed meal taken by a person of health and vigor. If this is the case, the deficiency will appear in the quantitative results obtained after the Ewald meal. And where such a condition is suspected or indicated, a Leube meal can be given after the Ewald test has been applied.

The Ewald test breakfast is given on a fasting stomach. Thus the meal may be given at 8 A.M., the patient having fasted since the dinner of the night before.

One hour after ingestion of the meal, the stomach tube is passed and the contents expressed.

The choice of one hour as the period of elapsed digestion before expression is founded upon experimental research. The most complete information can be secured if the contents be obtained at the period when all the physiological agents of digestion are present and active, and when the quantity of these approaches the maximum. This period has been found to be practically one hour after the ingestion of the Ewald meal.

As it is impossible, in ordinary clinical work, to obtain the contents in each case at exactly one hour after ingestion, I have this year made an investigation for the purpose of determining the effect of a longer interval than one hour upon the results in regard to the important conditions investigated.

The investigation consisted of the examination of the contents expressed one hour after an Ewald meal in fifteen normal cases, and an examination of the contents expressed one and one-half hours after this meal in fifteen cases. The results may be seen in the following table of averages:

TABLE I.

	1 Hour.	1½ Hours.
Average quantity of mixed contents . . .	120 c.c.	100 c.c.
Average total acidity	2 gm. p.m.	2·01 gm. p.m.
Starch present	2 cases.	2 cases.
Erethrodextrin present	8 "	6 "
Albumin present	15 "	15 "
Free HCl present	15 "	15 "
Lactic acid present	0 "	0 "

The conclusion to be drawn from these results is, that the conditions, the estimation of which is of importance in clinical work, do

not vary in the period between one hour and one hour and a half after ingestion of the food, to an extent sufficient to affect the significance of the results.

For practical work, then, the contents may be expressed at a period between one and one and one-half hours after ingestion of the meal.[29]

The tube used is a soft rubber tube, 75 to 90 centimetres in length. The end of this tube is introduced to the pharyngeal end of the esophagus and swallowed by the patient. When the tube has reached the stomach the contents are expressed.[30]

The simplest method of expression is that suggested by Ewald. This consists of pressure of the hand upon the epigastrium, and forced vomiting by the patient. The end of the tube is moved up and down in the stomach during the expression. As a rule, practically all of the contents can be obtained by this method. I have repeatedly tested its efficiency by following the expression with siphonage by the introduction of water.

Another excellent method of expression is aspiration. An aspiration bulb, with a short rubber tube on each end, is attached to the stomach tube. By alternate compression and expression of the bulb, under the control of appropriate stopcocks, the contents may be successfully aspirated.[31]

The expressed contents are measured, mixed thoroughly and subjected to the chemical analysis. The aim of this analysis is:

(1) The detection of the presence of the physiological agents of gastric digestion—the hydrochloric acid, pepsin and rennin.

(2) The determination of the quantity of these agents.

(3) The detection of certain abnormal products peculiar to definite pathological condition, if present—as lactic acid.

(4) The testing of the digestive capacity of the contents as removed.

The reason for these determinations and their value is clear from the consideration of the digestive function which has preceded. The integrity of the function is dependent upon the presence and sufficient amount of the physiological agents.

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[29] Cases of excessive activity of digestion are reported with disappearance of contents within one and one-half hours.

[30] The distance from the incisor teeth to the fundus of the stomach is about 23 to 26 inches.

[31] Boas: Magenkrankheiten, s. 104.

The failure of any agent, or of its normal amount, may, at the same time, point to the malady in a given case, and suggest a treatment.

The presence of the abnormal substances not produced in the normal stomach is itself an indication of a pathological process, and, to some extent, of the nature of this process.

Of secondary value may be the determination of the separate products of the proteid and carbohydrate digestion in the stomach.

Some writers ascribe considerable importance to these tests, especially the tests for starch and dextrin in the gastric contents; but recent works and my own observations, given later in this paper, tend to show that very little, if any, useful information can be obtained by these tests.[32]

In detail, the chemical analysis includes the following determinations:

The reaction.

The presence of free acids.

The qualitative determination of free hydrochloric acid, lactic acid, butyric acid, acetic acid, pepsin, rennin and the zymogen.

The quantitative determination of the total acidity, and of the total hydrochloric acid and of its factors, the total free and total combined HCl.

The determination of the digestive capacity of the contents.

In certain cases the following determinations may be useful, in addition to the above test:

The qualitative determination of starch, erethodextrin and achrodextrin.

The qualitative determination of native proteids, acid albumin, albumoses and peptones.

The quantitative determination of the total organic acids.

The quantitative determination of the total acid salts.

The determinations of the hydrochloric acid of the contents include:

(1) The detection of free hydrochloric acid.

(2) The quantitative estimation of the total free hydrochloric acid.

(3) The quantitative estimation of the total combined hydrochloric acid.

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[32] See Ewald: Klinik der Verdauungskrankheiten, Vol. II, s. 51.

(4) The quantitative estimation of the total secreted hydrochloric acid, that is, the free *plus* the combined hydrochloric acid.

The hydrochloric acid secreted by the stomach during digestion is disposed of in four ways. One portion combines with the inorganic bases of the food or of the saliva.

As the Ewald meal is in infusion acid, the amount of acid used in this way in cases examined by this method is practically that necessary to neutralize alkaline salts of the saliva.

This portion of the hydrochloric acid is not adaptable for the digestion of the food, and does not appear in the quantitative determinations of acidity.

A second portion combines with the proteid or albuminoid substances, either normal in the stomach, as mucin, epithelial cells, pepsinogen, rennin zymogen, or produced there in pathological conditions.

A third portion combines with the organic bases of the food, the proteid elements—to form acid proteids.

A fourth portion, which appears only when the first three portions are completed, exists as free acid.

These last three portions make up the total acid adaptable for purposes of digestion. They all appear in the quantitative determination of the hydrochloric acid—the first two as combined acid, the third as free acid.

The purely digestive function of the hydrochloric acid is, then, (*a*) to completely combine with the proteid food elements; (*b*) to combine with the pepsinogen and rennin zymogen, to liberate the ferments; (*c*) to serve as free acid, as a menstruum for the action of the pepsin upon the acid proteid combinations.

The object of our analysis in a given case is to determine if a sufficient amount of hydrochloric acid is secreted to perform this function.

From what has been said concerning the action of the acid, it is clear that this object is in some measure attained by the determination of the presence in the contents of free hydrochloric acid. Free acid present, we have the proteid affinities saturated, the ferments liberated and the conditions for peptic digestion present.

Even with free acid present, however, a more definite knowledge of the comparative vigor of the digestive function in a given case can be obtained by the determination of the total hydrochloric acid.

Thus, of two cases, both containing free acid, one may contain only enough acid to give a small amount of free acid, the other enough to give a large amount. The second condition is, within certain limits, indicative of a more vigorous function and greater reserve force.

In cases where no free hydrochloric acid is present, a quantitative estimation is our only method of determining how great a degree of hyposecretion is present.

For satisfactory work, therefore, both a qualitative test for free hydrochloric acid and a quantitative estimation of the total hydrochloric acid are necessary.

For the determination of the presence of free hydrochloric acid there are four good tests suited to practical work; these are Gunzburg's phloroglucin-vanillin test, Boas's resorcin test, Töpfer's dimethyl-amido-azo-benzol test, and the oo Tropeolin test.

Gunzburg's reagent consists of phloroglucin 2, vanillin 1, absolute alcohol 30.[33] One drop of the contents is heated on a white dish over a water-bath, and one drop of the reagent added. If free hydrochloric acid be present, a red zone of crystals is formed.

Boas's reagent consists of resorcin 5, sacch. alb., 3, spiritus dil. ad., 100. The test is performed in a manner similar to that described for the Gunzburg. Free hydrochloric acid gives a purple-red color.[34] These two reagents, the Boas and the Gunzburg, give no reaction whatsoever with organic acids, and are not interfered with by peptones or acid salts.

The oo Tropeolin test consists of the addition of one drop of a saturated alcoholic solution of oo tropeolin to one drop of the contents over a water-bath. Free hydrochloric acid gives a deep bluish-purple color. Organic acids give an orange color; acid salts a tawny yellow.

Töpfer's reagent consists of ½ per cent. alcoholic solution of dimethyl-amido-azo-benzol. One drop of this reagent is added to a portion of the contents in a test-tube. If free hydrochloric acid be present a carmine-red color appears. This reagent gives a brownish-red color with organic acids.[35]

All four tests are of about equal delicacy in testing straight solu-

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[33] *Centralblatt f. klin. Med.*, No. 40, 1887.

[34] Boas: Diagnostik, 2d Auflage, 1891, s. 134.

[35] Töpfer: *Zeitsch. f. Physiolog. Chemie*, 1894, Bd. XIX, H. 1, s. 104.

tions of hydrochloric acid. Where the acid is mixed with other substances, particularly with organic acids, as in the gastric contents, this equality of the different tests does not hold. In cases where considerable amounts of organic acid are present it is impossible to make an accurate reading from the Töpfer test. In other cases, owing to conditions not thoroughly understood, the Gunzburg test will react, while the OO Tropeolin fails, or the Töpfer test works where the Boas fails, or *vice versa*. It is my custom in general work to depend upon all four reagents. The Gunzburg test I have found the most satisfactory for the varying conditions. I therefore test the contents first with this test. If it reacts, free hydrochloric acid is present. If it fails, the Boas, Töpfer and OO Tropeolin tests are tried in turn. It is only when a positive test is lacking with all four that free hydrochloric acid is recorded absent.

The methods for the quantitative determination of the hydrochloric acid are of several kinds. Three type methods serve to illustrate the different principles employed in the various methods:

(1) Methods based upon the determination of the total hydrochloric acid by precipitation and estimation of the total chlorine present.

(2) Methods based upon the determination of the total HCl by estimation of the acidity of the ash.

(3) Methods based upon the determination of the total HCl by the reaction of color reagents.

The precipitation method is best represented by the method of Martius and Luttke, which is the most accurate of all the methods of this class.[36] This consists of the estimation of the total hydrochloric acid by determination of the total chlorine of the ash not present in the form of chlorides. This method, as all the accurate methods of this class, is too difficult for clinical work.

The second type of method is represented by the method of Seeman.[37] This method consists of (*a*) the neutralization of the total acidity of the contents with soda solution, in known amount; (*b*) the reduction of the contents to the ash, thereby driving off all the organic compounds; (*c*) the estimation by titration with decinormal acid solution of the acidity lost by this reduction; (*d*) the estimation of the total hydrochloric acid by subtraction of the lost organic

[36] Martius u. Luttke: Magensaure d. Menschen, Stuttgart, 1892.

[37] Seeman: *Zeitschr. f. klin. Med.*, Bd. V, s. 273.

acids total from the total acidity. This method is very simple. It is not, however, absolutely accurate, since the total acidity due to acid salts is contained in the total recorded as total hydrochloric acid.[38]

A review of all these precipitation and ash methods produced up to 1891 may be found in Martius and Luttke's "Magensaure d. Menschen."

The method of the estimation of the total hydrochloric acid by color analysis includes the following determinations:[39]

(*a*) The determination of the total acidity by phenolthalein.

(*b*) The determination of the total acidity due to free acids and acid salts by alizarin or Congo red.

(*c*) The determination of the total combined acids by subtraction of *b* from *a*.

(*d*) The determination of the total free hydrochloric acid by phloroglucin-vanillin or di-methyl-amido-azo-benzol.

(*e*) The determination of the total hydrochloric acid by the addition of *c* and *d*.

This color-analysis method has not the absolute accuracy of the precipitation methods.

It is, however, of sufficient accuracy for comparative work, and has the advantage of a simplicity fitting it for ordinary clinical work.

The details of this color-analysis process are as follows: The estimations are all made by titration of the contents with a decinormal solution of sodic hydrate.[40] Each cubic centimetre of this soda solution is capable of neutralizing 0·00365 gramme of hydrochloric acid. The estimation of the total acidity (*a*) is made by titration against the indicator phenolthalein. This reagent gives a red color in an alkaline solution, no color in acid solution. Ten cubic centimetres of the mixed contents are diluted with water, and two or three drops of a 1 per cent. alcoholic solution of phenolthalein added. To this mixture the decinormal soda solution is added from a graduated burette until a definite red color appears and remains

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[38] Hari: Archiv f. Verdauungskrankheiten, Bd. II, H. 203.

[39] This plan of analysis is that originated by Töpfer, with some modification of the tests. Töpfer: *Zeitschr. f. Physiol. Chemie*, Bd. XIX, H. 1.

[40] One-tenth molecular weight of NaOH + 1,000 c.c. distilled water = 4 grammes to 1,000 c.c.

after shaking. The presence of the red color shows that all the acid present has been neutralized.

By multiplying the number of cubic centimetres of decinormal soda solution used (x) by 0·00365 gramme, we obtain the total acidity, in equivalents of hydrochloric acid, of the 10 cubic centimetres of contents, and from this result the per cent. or per mille amount of acid is estimated.

The estimation of the total acidity due to free acids and acid salts (b) is performed in the same manner, using Congo red as the preliminary indicator and alizarin as the final indicator.

Congo red paper, prepared by dipping filter paper into a strong aqueous solution of Congo red, turns a clear blue color in the presence of free HCl, purple in the presence of organic acids, and a dull brown with acid salts. In the presence of combined acids it does not change color. In this test the decinormal solution is added to a given amount of the contents until a drop of the mixture fails to give any change of color to the Congo red. The reading taken at this point is recorded as the preliminary record of the amount of free acids *plus* acid salts present.

An aqueous solution of alizarin monosulphonate of soda (1 per cent.) of a yellowish color gives no change of color when added to a solution containing free acids or acid salts, but gives a purple color in alkaline solution or in an acid solution, the acidity of which is due to combined acids alone. Decinormal soda solution is added to a portion of the contents, to which two or three drops of a 1 per cent. solution of alizarin has been added, until a purple color is obtained. The appearance of this color marks the neutralization of the free acids and acid salts. It is the final record of the amounts of these substances.

The alizarin test is the more accurate, and should be taken as the final index, where it is possible to get an accurate result with it.

The reason for employing both the Congo red and alizarin in this estimation is that it is impossible in some cases to make an accurate reading by the alizarin test, the point of transition from a yellow to a purple color not being abrupt.[41]

In such cases the record by the Congo red test must be used. The reading by this test will always be less than the alizarin test by about 0·1 to 0·3 c.c. decinormal solution to 10 c.c. contents, as the

[41] Mohr: *Zeitsch. f. Physiolog. Chemie*, Bd. XIX, H. 6, s. 67.

first records the end of the acid reaction, while the latter records the actual alkaline reaction.

By the subtraction of the total acidity due to free acids *plus* acid salts (*b*) from the total acidity (*a*), the acidity due to combined acids is obtained (*c*). Where free hydrochloric acid is present, all of the combined acid is combined hydrochloric acid, whatever organic acids may be present.[42]

The estimation of the total free hydrochloric acid (*d*) is performed by titration with the decinormal soda solution until the test for free HCl can no longer be obtained. Ten cubic centimetres of the contents, to which two drops of the ½ per cent. alcoholic solution of di-methyl-amido-azo-benzol have been added, are titrated with the soda solution until the red color of the mixture gives place to a yellow color. This point determines the neutralization of the free HCl. This is the simplest method of performing this test. It has, however, one great disadvantage as a test for general use. Where any considerable quantity of organic acids is present in the contents, the point of transition from a carmine-red to a yellow color is not sharp and cannot be accurately determined.[43] The organic acids give a brownish-red color, which is not unlike the much diluted carmine red of the mineral acids.[44] For this reason I have used phloroglucin-vanillin as the indicator in place of or in addition to Töpfer's reagent. The test with this reagent can never be confused by the presence of organic acids or other constituents of the gastric contents. Ten cubic centimetres of the contents are titrated with the soda solution until a drop of the mixture fails to give the free HCl reaction with phloroglucin-vanillin. The last reading before the failure of the test is taken as the measure of the hydrochloric acid. Thus, if the test responds after the addition of 4 c.c. one-tenth soda solution and fails with the addition of 4·1 c.c., the free HCl in the 10 c.c. of contents $= 4 \times {\cdot}00365$ gramme.

The total hydrochloric acid (*e*) is determined by the addition of the total combined HCl (*c*) and the total free HCl (*d*), in cases where free HCl is present. Where no free HCl is present the total hydrochloric acid can be estimated by the following method (Mintz method):

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[42] Boas: *Loc. cit.*

[43] Hari: Archiv f. Verdauungskrankheiten, Bd. II, H. 203.

[44] Strauss: *Deutsches Archiv f. klin. Med.*, Bd. LXVI, H. 1.

Mohr: *Loc. cit.*

To 100 c.c. of the contents add a decinormal solution of hydrochloric acid until the test for free HCl with phloroglucin-vanillin is obtained. Since the limits of the Gunzburg reaction is 0·036 gramme per mille HCl (that is, 1 c.c. decinormal soda solution to 100), the difference between this figure and the amount of decinormal soda solution used represents the amount of combined HCl present in the 100 c.c. of contents, that is, the total hydrochloric acid present. For example, if Gunzburg's reaction were first positive after the addition of six-tenths of a cubic centimetre decinormal HCl solution to 100 c.c. contents, then 1 — 0·6 = 0·4 c.c. one-tenth normal HCl is the amount of HCl already present in 100 c.c. of contents. This process can be conducted with less than 100 c.c., if necessary.

The total combined acid (*c*) in cases where no free HCl is present represents the sum of the combined hydrochloric and combined organic acids. Where no organic acids are present by the qualitative tests, the total combined acid (*c*) may be taken approximately as the total hydrochloric acid in these cases.[45]

As an example of the application of this method, I give the results of the examination of the contents of a normal stomach—contents expressed one hour after an Ewald test meal.

Amount of contents, 160 c.c.

Amount of filtrate, 85 c.c.

A. Ten cubic centimetres mixed contents *plus* two guttæ phenolthalein gave red color on addition of 7 c.c. decinormal soda solution. ∴ Total acidity of 10 c.c. contents $= 7 \times 0{\cdot}00365$ gramme $= 0{\cdot}02555$ gramme HCl = per mille $\frac{1000}{10} \times 0{\cdot}02555 = 2{\cdot}55$ grammes.

B. Ten cubic centimetres contents with Congo red paper fail to give change of color at 4·7 c.c. decinormal NaOH. ∴ 1·71 grammes per mille HCl = preliminary record total free acids *plus* acid salts. Same 10 c.c. contents give purple color with alizarin on addition of 4·9 c.c. NaOH solution. ∴ Total acidity due to free acids *plus* acid salts in 10 c.c. $= 4{\cdot}9 \times {\cdot}00365 = 1{\cdot}78$ grammes per mille (final record).

C. Total combined acid = *A* — *B*, that is, $2{\cdot}55 - 1{\cdot}78 = 0{\cdot}77$ per mille.

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[45] The qualitative tests for lactic and butyric acids, etc., react to lactates and butyrates, as well as the free acids.

D. Ten cubic centimetres contents titrated with NaOH failed to give red color with phloroglucin-vanillin, first, on addition of 3·2 c.c. NaOH solution — responded with 3·1 c.c. ∴ Total free HCl = $3{\cdot}1 \times {\cdot}00365 \times 100 = 1{\cdot}13$ grammes per mille.

E. Total hydrochloric acid = $C + D$, that is, $0{\cdot}77 + 1{\cdot}13 = 1{\cdot}90$ gramme per mille.

F. Total acidity due to organic acids *plus* acid salts = $B - D$, that is, $1{\cdot}78 - 1{\cdot}13 = 0{\cdot}65$ gramme per mille.[46]

The whole process of quantitative determination by this method can be accomplished with simple apparatus within twenty minutes.

The results, though not of absolute accuracy, are accurate for comparative work. For example, the delicacy of the test for free HCl is ·05 gramme per mille. The total free HCl is thus for 3·1 c.c. NaOH solution not 1·13 per mille, but 1·13 + 0·05 per mille. Also the error incident upon the judgment of colors must affect the results in this method for absolute work. The above sources of error are, however, constant in comparative work, and thus do not affect the results.

A certain amount of the secreted HCl combines with the phosphates of the food, forming acid phosphates, which contribute to the sum of the total acidity of the contents. In some cases it may be useful to estimate these total acid salts and the total organic acids separately. This may be accomplished by the addition of the following method (Leo's method) of estimating the total acid salts to the scheme of analysis already given.[47]

To 15 c.c. contents add 1 gramme dry powdered $CaCO_3$; shake; filter. Measure off 10 c.c. of filtrate; pass a stream of hot air through it to carry off the CO_2; add 5 c.c. $CaCl_2$, add one drop of phenolthalein, and titrate with decinormal soda solution. The total acidity of this last filtrate divided by 2 is the total acid salts contained in the 10 c.c. of contents. The $CaCO_3$ unites with all the acid elements of the contents save the acid salts, forming of the HCl calcic chloride, of the lactic acid lactate of calcium, etc. In the presence of the $CaCl_2$ thus formed twice the amount of decinormal

[46] If the acid salts are computed by the method given below, we get the following addition to the above record: G total acid salts subtracted from B_2 (total free acids and *plus* acid salts in mixture with $CaCl_2$ = total free acids (H). Subtract total free HCl D from total free acids (H) — total organic acids (K).

[47] Leo: Krankheiten der Verdauungs Organ, Berlin, 1890.

soda solution is necessary to neutralize the acid phosphates, as in the absence of $CaCl_2$; hence the division by 2 of the final result.

If this total acid salts (G) be subtracted from the total of organic acids *plus* acid salts obtained as described above, but after the addition of 5 c.c. of concentrated solution of $CaCl_2$ to the 10 c.c. of contents (B_2), we have, as a result of our subtraction, the total organic acids (see addenda to analysis).

This plan of analysis is, as I have stated, a modification of the method published by Töpfer.[48] The modifications consist in:

(1) The addition of the Congo red test for free acids and acid salts to the alizarin test as given by Töpfer, in the quantitative estimation of these substances.

(2) The substitution of the phloroglucin-vanillin test for HCl, for the di-methyl-amido-azo-benzol test of Töpfer in the quantitative estimation of the HCl.

The reasons for these changes are given in the description of the methods (see preceding pages). As I have stated in the description referred to, the Töpfer tests are satisfactory for a majority of cases examined, but not for many cases, especially those with pathological conditions. The objections to the tests cited are based upon the researches of Hari,[49] Strauss,[50] Mohr,[51] and upon my own experience in analyses of the gastric contents.

The pepsin of the gastric juice is produced from the pepsinogen formed in the glands of the gastric mucous membrane by the action of free hydrochloric acid upon this pepsinogen.[52] Since pepsin may be found in gastric contents containing no free hydrochloric acid, it is probable that the secreted acid has combined with the pepsinogen before the affinities of the proteid foods are satisfied.[53]

The pepsin acts only in the presence of free hydrochloric acid. The evidence of the presence of pepsin in the contents of a given case is assured by the capacity of this contents to digest albumin.

If free hydrochloric acid be present, the determination of the

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48 Töpfer: *Zeitschr. f. Physiol. Chemie*, Bd. XIX, H. 1.

49 Hari: Archiv f. Verdauungskrankheiten, Bd. II, H. 203.

50 Strauss: *Deutsches Archiv f. klin. Med.*, Bd. 56, H. 1.

51 Mohr: *Zeitschr. f. Physiolog. Chemie*, Bd. XIX, H. 6, s. 6, H. 7.

52 Langley: *Journal of Physiology*, Vol. VII, p. 391, and Vol. III, p. 269.

53 Hammerschlag (Archiv f. Verdauungskrankheiten) finds considerable amounts of pepsin in cases with no free HCl.

pepsin is conducted as follows: 50 milligrammes of coagulated egg albumin are placed in 25 c.c. of the filtrate of the contents, and the mixture kept at a temperature of 40° C. If pepsin be present, digestion of the albumin will occur. If no free hydrochloric acid be present in the contents, the same test is applied, the contents having first been brought to the proper acidity by the addition of hydrochloric acid.

These determinations performed in this way also enable us to form some rough quantitative estimation of the pepsin present. In the normal contents, 50 milligrammes of egg is entirely dissolved in 25 c.c. of contents within three hours. The acidity being normal then, either naturally or by addition of acid, a duration of the dissolution of the egg over three hours indicates a diminution in pepsin.[54]

A more definite quantitative estimation, suited to practical work, may be made as follows:[55] A 1 per cent. solution of albumin (dry) containing 4 per cent. free hydrochloric acid is made up. This is divided into two portions of 10 c.c. each. To one portion 5 c.c. of water are added, to the other 5 c.c. of the filtrate of the gastric contents to be tested. Both mixtures are then placed at a temperature of 40° C. for one hour. The amount of albumin in each solution is then tested by means of an Esbach albuminometer, and from the comparative results the per cent. strength of the contents estimated. Thus, if the first solution shows 6 per cent. albumin and the second 3 per cent., the contents are said to have a 50 per cent. strength pepsin. The normal contents give from 80 per cent. to 90 per cent. by this test.

Rennin, the milk-curdling ferment of the stomach, is formed from its zymogen, which exists in the cells of the gastric mucous membrane, by the action of the secreted acid. A certain amount of rennin can, however, be obtained by the addition of water to the mucous membrane, even where no free HCl is present in the stomach. Rennin is active in acid, neutral or even feebly alkaline solutions.[56]

The normal gastric contents contain both rennin and its zymogen.[57]

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[54] Hammerschlag: Naturforscher-Versammlung, 1894, und Archiv d. Verdauungskrankheiten, Bd. II, H. 1.

[55] Jaworski: *Zeitschr. klin. Med.*, Bd. XI, s. 275.

[56] Heintz: *Jour. f. prakt. Chemie*, Neur. Folg., Vol. VI, p. 374.

[57] Hammarsten: Mohr's Jahrsbericht, Vol. II, 118, Vol. IV, 135, Vol. VII, 158.

The test for rennin is as follows: 10 c.c. of the filtrate of the gastric contents are neutralized with decinormal solution of NaOH. To this 10 c.c. of neutral milk are added, and the mixture tested at 38° C. If rennet be present, casein will form in ten to fifteen minutes.[58]

The test for the zymogen is as follows, in the absence of the ferment: To 10 c.c. of the filtrate, made slightly alkaline, add 2 c.c. of a 1 per cent. solution of calcium chloride; then 10 c.c. of milk, and heat at 38° C. If rennet is present casein will form. It is rare to find a condition in which rennet or the rennet zymogen is wholly absent, but a marked diminution of these substances is characteristic of certain morbid conditions.

In some cases, therefore, aid may be derived from a quantitative estimation of these substances.

The quantitative estimations for rennet and the zymogen are as follows: Part of the gastric filtrate is exactly neutralized, and portions of this diluted to different dilutions, as one-tenth, one-fifteenth, one-twentieth. Five c.c. of each dilution are placed with 5 c.c. of neutral milk at 38° C., and the dilution at which the ferment ceases to be active ascertained. By comparing the result with normal results, any diminution and the amount of it can be observed. For the zymogen a portion of the filtrate is made alkaline; different dilutions made, one-tenth to $\frac{1}{16}$; 5 c.c. of dilution placed with 1 c.c. $CaCl_2$, *plus* 5 c.c. of milk; and the dilution where action ceases recorded.

Full tables of the normal amounts of the rennin and its zymogen in the normal conditions can be found in Friedenwald's article on the subject.[59]

(*To be continued.*)

RECENT LITERATURE RELATING TO PHARMACY.

EFFECTS OF MINERAL SALTS ON THE DEVELOPMENT OF PLANTS.

M. C. Dassonville has made a series of experiments on the effect of solutions of various mineral salts, especially of Knopp's solution, on the growth of cereal crops—wheat, rye, oat and maize—as compared with that of pure water. The general result arrived at is that

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[58] Boas: Magenkrankheiten. *Loc. cit.*

[59] Friedenwald: *Medical News*, June 22, 1895.

with distilled water the tissues are less fully developed, but more strongly lignified. Thus, in a saline solution, both the roots and the stem become longer; the size both of the vessels and of the air cavities is increased, while the walls of the vessels are less strongly lignified.—*Comptes rendus*, cxxiv, p. 1467, through *Pharmaceutical Journal*, November 27, 1897.

IRRITATION CAUSED BY WINTERGREEN OIL.

In the course of treating cases of rheumatism by means of the absorption of methyl salicylate, Vidal noticed that some samples of oil of wintergreen caused irritation of the skin, in some cases even causing an eruption. Investigation showed that irritation invariably followed the use of the natural oil of wintergreen, and that when pure synthetic methyl salicylate was employed simultaneously on the same subject no discomfort whatever was felt. It is evident, therefore, that the natural oil contains some irritant body, and that the pure synthetic oil is to be preferred for application to the skin.—*Nouv. Rem.*, xiii, 615, through *Pharmaceutical Journal*, November 27, 1897.

DOUBLE RICE.

In the *Proceedings of the Asiatic Society of Bengal*, for April, 1896, Dr. D. Prain describes and figures what is known in India as double rice. In all cases the phenomenon was found to be due to an increase in the number of ovaries, the other parts of the flower being invariably of the normal number. In the gynæceum of over 150 flowers examined, not one was found with fewer than four ovaries, all apparently perfect, the usual number being five. A few flowers were found to have six, and one or two had seven ovaries. When five, six or seven ovaries were present, sometimes only three, but usually four or five, appeared to be perfect. The ovaries may be one-, two-, or three-styled. Usually only two ovaries develop into grain, sometimes three, and their shape is modified accordingly.—*Kew Bulletin*, April, 1897.

SORGHUM SUGAR.

The sugar sorghum or broom-corn (Andropogon Sorghum, Brot., var. Saccharatus, Koern.), is a grass largely cultivated in Northern India, China and Japan, as well as in the United States. It is, however, native of none of these countries, and its original home is ob-

scure, but is probably tropical Africa. For many years past a strenuous effort has been made in North America to utilize the sugar sorghum as a source of sugar in a zone north of that in which the sugar-cane is grown. The result has not, however, been very successful, as the sugar can only be obtained for the most part in an uncrystallizable form. Syrup is, however, a large article of consumption in the United States, and this alone affords the industry a chance of success.—*Kew Bulletin*, April, 1897.

ON A NEW CLASS OF OXIDIZING SUBSTANCES—THE PERCARBONATES.

The discovery of this series of compounds was recently announced by MM. Constan and A. von Haussen. These authors report that on electrolyzing a saturated solution of potassium carbonate, and gradually lowering the temperature, the disengagement of oxygen at the anode ceases altogether at—10° C. And that instead of the crystalline bicarbonate being formed, as is the case when an alkaline carbonate is subjected to electrolytic action under ordinary conditions, the result is a bluish amorphous powder, having the formula $K_2C_2O_6$. This is percarbonate of potassium, but it is not formed in dilute solutions. Owing to its hygrometric character, the powder should be quickly thrown on a filter, and dried over phosphoric anhydride. It is decomposed by gentle heating, into the normal carbonate, carbon dioxide and oxygen. In the presence of oxidizable substances it acts as an oxidizing agent; but it may act as a reducing agent. From these properties the authors conclude that this compound is a neutral carbonate of peroxide of potassium. Like the higher alkaline oxides and the alkaline earths, it produces hydrogen peroxide in the presence of acids.—*Zeitschrift für Electrochemie*, through *Chemical News*, October 1, 1897.

FRUIT INDUSTRIES IN JAMAICA.

Kew Bulletin for July, 1897, contains some interesting statements in regard to the exports of Jamaica. The total value of these for 1895–96 was £1,873,105, and nearly two-thirds of this amount was for exports to the United States. The trade between Jamaica and the United States is chiefly in fruits and other fresh tropical produce, and these are conveyed by a fleet of steamers specially fitted for the purpose. The principal fruit cultivated is the banana, and of this 4,220,796 bunches, having a value of £316,560, were exported

in 1895-96. During the same period, owing to the recent destruction of the orange trees in Florida, 97,925,398 oranges, valued at £169,-794, were also exported. Some other valuable products, including logwood, coffee, ginger, allspice, etc., are enumerated. In addition, the exports of the following fruits and fruit products appear to be increasing from year to year: Cocoanuts, grape fruit, shaddocks, Tangerine oranges, limes and lime-juice, pineapples, kola nuts and tamarinds. The total value of the fruit exported from Jamaica at the present time amounts to £537,601. The fruit exported from Jamaica as the Tangerine orange is for the most part the large-fruited Mandarin orange, native of China. Both the leaves and the loose rind of this fruit possess a characteristic odor unlike that of any other of the orange tribe. The true Tangerine orange is smaller than the Mandarin, with an agreeable but slightly perfumed flavor.

BROOM ROOT.

An account of broom root, or Mexican whisk, obtained from one or more species of grasses belonging to the genus Epicampes, was given in the *Kew Bulletin* for December, 1887 (p. 9). The roots in the condition in which they are exported are known as "Raiz de Zacaton." During some years very little has been exported, but latterly increased interest has been taken in them as a cheap substitute for the well-known Venetian whisk, derived from the roots of Chrysopogon Gryllus. The most recent information respecting broom-root is contained in the following "Report for the year 1895 on the Trade of Mexico" (F. O., 1896, Annual Series, No. 1827):

"From the roots of a coarse, tufty grass, known as 'Zacaton,' which is found growing wild all over the highlands of Mexico, a fibre is extracted called 'Raiz de Zacaton,' which has found a market abroad for the manufacture of certain kinds of brushes and whisks. It is collected by hand, and is subjected to very little treatment before being baled, beyond being soaked in water and bleached in the sun. The principal market for this fibre is Hamburg, but the United States and France both take a certain amount. It has never obtained a foothold in the English market. The export in 1895 was valued at 67,599*l*. The price, according to the New York quotations, ranged in the year under question from 6c. to 14c. per pound, according to quality."—*Kew Bulletin*, April, 1897.

WINE PRODUCTION IN FRANCE.

The following information concerning the above subject is taken from *Kew Bulletin*, in its issue of May and June, 1897:

The annual wine production of France, which, during the twenty-five years preceding the year 1879, amounted on the average to 1,000,000,000 gallons, a quantity sufficing both for the wants of home consumption in this country and for those of the export trade to foreign countries (about 65,000,000 to 75,000,000 gallons per annum), has since that time (in consequence of the ravages of the phylloxera and other vine diseases, as well as of unfavorable atmospheric influences during many years) declined to an average annual yield of about 725,000,000 gallons, a falling off, therefore, of about 275,000,000 gallons per annum.

In order to meet this deficiency, France, as is well known, has been obliged to import largely foreign (more especially Spanish, Italian, Portuguese and Dalmatian) wines, which are to some extent sold in their original state, but the far larger proportion are used for blending with the light French wines of the commonest class. These blended Franco-foreign wines find a ready market, as they are by no means always unpalatable, and often very fair (nor are they unwholesome, as they are, after all, mixtures of the pure juice of foreign and French grapes); they are served as so-called "vin ordinaire" in a large number of even the better class of hotels and restaurants all over France. On the other hand, however, the dearth of the cheapest kind of French wines, which in former times were abundant enough to be obtained even by the most modest purse, has given rise to a great development of the manufacture of artificial wines (made from raisins and other grape substitutes), and these find a ready market, especially amongst those poorest classes of the population who look more to the low price than to the quality of the liquor, of which they are accustomed to drink a large quantum. That in the Gironde, for instance, this daily quantum of wine is considerable amongst both the poorer and wealthier inhabitants is evident from the fact that the average annual consumption of wine per head of the population in this department amounts to 32·34 gallons.

EDITORIAL.

MORE PURE FOOD INJUSTICE.

Pure food legislation is having a hard struggle in Monroe County, this State. It was from that locality that we reported, last month, the failure to convict in an acknowledged case of adulterated mustard, because the jury could not decide whether it was a food or poison. This month it is reported that two firms were indicted for selling impure vinegar. The indictments were quashed because the defendants were arrested prior to the Act of Assembly passed in 1897. The judge concluded his opinion as follows: "It is impossible for us sustain this indictment. It cannot be sustained under the Act of 1897, because the Act was not in existence when the offence charged was committed. Nor can it be sustained under the Acts of 1891 and 1895, because they were repealed without any saving clause." The question of guilt does not appear to have entered into these cases; it is rather a question of technicalities. Justice was so tardy that a new law was created which enabled the defendants to escape. Such defects in the administration of the law make dealers defiant, and are a menace to the public. When no laws are in existence the people learn to take some precautions for themselves. It is said that the Pure Food Commission has lost every case tried in Monroe County. We are not prepared to say that no laws should be passed for the prevention of food and drug adulteration, but we do say that conviction under these laws has heretofore been very difficult. As a rule, there has been no question about the guilt of the parties arrested, but some legal loophole has usually been found. A number of cases have occurred where the defendant has escaped because the law did not state which edition of the U. S. Pharmacopœia should be used as a standard. That defect, however, has been remedied in many of the laws.

DESTRUCTION TO COUNTERACT OVERPRODUCTION.

Anent this subject, which has received some attention in the two preceding numbers of this JOURNAL, Professor Lloyd furnishes the following from Valmont-Bomare, Dictionnaire, Vol. IX, Lyon, 1800, Muscade, p. 323: Speaking of the storehouses of the Dutch for precious spices, the author says: "The Dutch do not distribute their recent harvests, but always their oldest; in 1760 they sold the stock of 1744. It is commonly believed in France and other countries that when the Dutch have too much of cloves, or nutmegs, etc., in their storehouses, they throw the surplus into the sea. But it is not in this manner that they get rid of these spices; they *burn* them. On the 10th of June, 1760, I saw a fire in Amsterdam, near the Admiralty, that was fed by goods estimated at 8,000,000 of French money; the following day another lot, amounting to the same value, was to be burned. The spectators' feet bathed in the essential oil of these substances, but nobody was permitted to gather any of it, nor to take any of the spices that were in the fire. I was told that some years ago, in the same place, a poor individual who, in a similar fire, picked up a few nutmegs that had dropped and rolled away from the furnace, was seized bodily, condemned to be hanged, and executed on the spot."

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

AN EPITOME OF THE HISTORY OF MEDICINE. By Roswell Park, A.M., M.D. The F. A. Davis Company, Philadelphia, New York and Chicago. 1897.

The author believes that the history of medicine has been sadly neglected in our medical schools, and that much of "what not to do" might be learned by a more careful study of this subject. "The history of medicine," he says, "is really a history of human error and human discovery. During the past 2,000 years it is hard to say which has prevailed."

After a preliminary history of the very earliest times, the subject is divided according to the arrangement of Renouard as follows:

AGE OF FOUNDATION.—(1) The *Primitive Period*, or that of *Instinct*, beginning with myth, and ending with the destruction of Troy, 1184 years before Christ.

(2) The *Sacred or Mystic Period*, ending with the dispersion of the Pythagorean Society, 500 years before Christ.

(3) The *Philosophic Period*, terminating with the foundation of the Alexandrian library, 320 years before Christ.

(4) The *Anatomic Period*, ending with the death of Galen, about A. D. 200.

THE SECOND AGE, OR THAT OF TRANSITION, is divided into a fifth, or *Greek Period*, ending at the burning of the Alexandrian library, A.D. 640, and a sixth, *Arabic Period*, ending with the revival of letters, A. D. 1400.

THE THIRD AGE, OR THAT OF RENOVATION, includes the seventh or *Erudite Period*, comprising the fifteenth and sixteenth centuries; and eighth, or *Reform Period*, comprising the seventeenth, eighteenth and nineteenth centuries.

With such a groundwork, a very readable book has been produced. A final chapter of some ten pages is devoted to "An Epitome of the History of Dentistry."

The text is enlivened and the whole book much improved by fifty-six excellent figures, mostly of prominent physicians, beginning with Esculapius, and ending with Lord Lister.

The book is written in excellent style, and tends to hold the attention of the reader throughout. It contains a large amount of matter admirably condensed, and we only notice one omission, namely, pharmacy; no reference whatever is made to this important part of medicine, except in the quoted title of some book or paper. Will any one admit that the history of medicine in any age can be complete without some reference to pharmacy?

INTRODUCTION TO ELECTROCHEMICAL EXPERIMENTS. By Dr. Felix Oettel. Translated by Edgar F. Smith. P. Blakiston, Son & Co., Philadelphia. 1897.

The purpose of this volume is to furnish technical chemists and all others interested in the applications of electricity to chemical manufacture with a concise guide, containing in a compact form all that is essential for the comprehension and solution of problems arising in this comparatively new field of chemical investigation. The subject is considered under the following headings: (1) Source, Measurement and Regulation of Current; (2) Arrangement of Experiments; (3) Phenomena Observed in Electrolysis; (4) Preliminary Experiments of an Electrolytic Process; (5) Calculation of Necessary Power, Choice of Dynamo; (6) Practical Part; (7) Tables.

Much practical information is contained in the 144 pages, and the whole is made more attractive and available by the 26 illustrations.

PRACTICAL EXERCISES IN ELECTROCHEMISTRY. By Dr. Felix Oettel. Translated by Edgar F. Smith. P. Blakiston, Son & Co., Philadelphia. 1897.

Much is heard in these days about the study of electrochemistry, but the student is at a loss to know where to make a beginning. This book of 92 pages supplies one with the necessary technique of the subject. By working through this book the student would have his ideas enlarged similarly to one who has taken a practical course in chemistry. Many of the experiments are types of definite processes, which are not only instructive, but suggestive. Much credit is due Dr. Smith for rendering this and the foregoing work available to English-speaking students.

RECUEIL DES LOIS DE LA BIOLOGIE GÉNÉRALE. Par A. L. Herrera, Ancien Président de la Société Alzate. Lauréat de l'Institut Smithsonien. Mexico. 1897.

This is a compilation of what may be termed laws in the science of biology, which are so well established as to be used as the basis for theories, of which there are a number in existence. The great laws are those concerning time, unity, elementary life, particular ends, differentiation, variability, adaptation, selection, distribution, struggle for existence and evolution. These are subdivided, and the law governing each subdivision is briefly stated in a way to make the whole a valuable reference book for biologists. It is evidently the result of much investigation by the author, as well as a close study of the results of others.

OBSERVATIONS ON RECENT CASES OF MUSHROOM POISONING IN THE DISTRICT OF COLUMBIA. By Frederick V. Coville. Department of Agriculture, Division of Botany. Circular No. 13.

With the aid of photographic reproductions and a clear description, the author is able to give much information that will assist in distinguishing the edible from the poisonous mushrooms. Very sensible advice is given to the novice, who is too apt to rely on printed descriptions, namely, to get his authority for the identity and qualities of each one he adds to his list from some person having unquestioned expert knowledge of the subject.

NORTH AMERICAN LEMNACEÆ. By Charles Henry Thompson. Printed in advance, from the Ninth Annual Report of the Missouri Botanical Garden.

The natural order Lemnaceæ has been especially studied by such authorities as Schleiden, Austin, Hegelmaier, Engelmann and Torrey. The author has sought to bring together the results of these investigations, and include his own researches of the past two years. The outcome is a valuable revision of the American species in this order.

THE PHYLOGENY AND TAXONOMY OF ANGIOSPERMS. By Charles E. Bessey, Ph.D. Address of the retiring president, delivered before the Botanical Society of America, at its third annual meeting, Toronto, Ontario, August 17, 1897.

With the aid of diagrams this rather technical subject has been made clear and popular in character.

AN UNUSUAL PHYTO-BENZOAR. By William Trelease. Transactions of the Academy of Science, St. Louis, Mo., Vol. VII, No. 18.

This is the record of two specimens from Mexico, one measuring 3½ inches in diameter and weighing 7½ ounces; the other one half of a similar ball about 4 inches in diameter and weighing 4 ounces. Sixteen of these balls were taken from the stomach of a bull. They were found to be composed of the agglomerated fibres of several species of Opuntia. Photographic reproductions accompany the description.

BEITRÄGE ZUR CHEMIE DER SOG. GERBSÄUREN (GLYKOTANNOIDE). Von Hermann Kunz-Krause, Lausanne. Reprint from *Chemiker Zeitung*, **21**, No. 90.

UEBER DIE SPONTANE VERÄNDERUNG DER PFLANZENSTOFFE, ÜBER DIALYSIRTE PFLANZEN EXTRACTE (DIALYSATA) UND ÜBER DIE CAPILLARANALYSE IM DIENSTE DER PHARMACIE. Von Hermann Kunz-Krause, Lausanne. Reprint from *Chemiker Zeitung*, **21**, No. 90.

INFLUENCE DE LA SÉCHERESSE DE 1893 SUR LA VÉGÉTATION FORESTIÈRE. Par E. Henry, Nancy. A communication made to the School of Forestry, February 15, 1897.

CEPHAELIS IPECACUANHA. By John Uri Lloyd. Reprint from *Western Druggist*, August, 1897.

This is a complete account of this important drug, beginning with its botanical origin and carried through its interesting history, cultivation, collection, chemical constituents, adulterations, physiological properties and bibliography.

VERATRUM VIRIDE. By John Uri Lloyd. Reprint from *Western Druggist*, October, 1897.

Like the preceding, this is an interesting study of an important drug. The section on the chemical composition is especially complete, and, although the author has summed up a mass of literature on the subject, he suggests that an additional investigation should be made, in order to more clearly define the chemical characters.

CHLORALAMID. Published by Lehn & Fink, New York. Sixth edition.

The various investigations which have been made on the value of this new hypnotic are given, supplemented by the opinions of a large number of physicians.

PROCEEDINGS OF THE FIFTEENTH ANNUAL MEETING OF THE MICHIGAN PHARMACEUTICAL ASSOCIATION, held at Grand Ledge, August, 1897.

The Michigan Pharmacy Law is included in this report. It also contains the several original papers that were read at the meeting.

PROCEEDINGS OF THE MINNESOTA PHARMACEUTICAL ASSOCIATION AT THE THIRTEENTH ANNUAL MEETING, held at Lake Minnetonka, August, 1897.

PROCEEDINGS OF THE SIXTEENTH ANNUAL MEETING OF THE VIRGINIA PHARMACEUTICAL ASSOCIATION, held at Charlotteville, July, 1897.

PROCEEDINGS OF THE PENNSYLVANIA PHARMACEUTICAL ASSOCIATION, AT ITS TWENTIETH ANNUAL MEETING, held at Delaware Water Gap, June, 1897.

MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, December 21, 1897.

The regular Pharmaceutical Meeting was held at 3 P.M., with Dr. C. B. Lowe in the chair.

The minutes of the previous meeting were allowed to stand as published. The next in order was the presentation and exhibition of specimens. Among these were two flowering plants of Scotch heather, belonging to Mr. Howard B. French. It was thought that these would be of interest on account of the sentiment attaching to this plant in Scotland. Dr. A. W. Miller said that a species of heather, Calluna vulgaris, grows at Egg Harbor, N. J., where it attains a height of 2 or 3 feet, the conditions seeming to favor its growth in that locality. Samples of metallic aluminum, nickel and cobalt, and one of pyrolusite (from Reno, Nev.) were donated by Mr. Charles Bullock. The Registrar, Mr. T. S. Wiegand, presented specimens of metallic zinc, antimony, copper and manganese. Samples of several kinds of material used for water filtration were received from Dr. F. E. Stewart, and a sample of false or Bombay mace, which is used as an adulterant, was sent by Mr. Richard M. Shoemaker.

On motion, a vote of thanks was tendered the donors of specimens.

A paper on "Liquid Benzoin for Benzoinating Lard," was read by J. W. England, in behalf of the author, Richard M. Shoemaker.

Samples of gum benzoin, the liquid benzoin and benzoinated lard, made by the use of the latter, accompanied the paper.

Professor Trimble spoke of the particular value of this paper from the standpoint of its utility. He attributed the preservative action of benzoin mostly to the benzoic acid, which, he said, appeared to have a preservative effect on vegetable and animal matter, while boric acid is most largely used for preserving animal substances. Others were of the opinion that the preservative action is due to the volatile constituents or to the resin.

Upon request, Dr. A. W. Miller presented quite an interesting description of the plants conspicuous on our streets previous to Christmas, in a paper having the title: "Botany on Market Street." These plants are mostly evergreens, some of them being brought from the Southern States, and, in order to make the description instructive as well as pleasing, the scientific and common names were both given. An occasional introduction of poetical selections, inspired either by the customs of this season of the year or by some particular plant, harmonized well with the subject.

"A Contribution to the Knowledge of the Gum from the Oil Tree" was the subject of a highly meritorious paper read by Charles W. Dirmitt.

Professor Trimble remarked upon the interest which attaches to this so-called gum, on account of the relation which it appears to sustain to the higher fatty acids. He called attention to samples of the gum, and of the residue left after distillation.

A paper entitled "On the Use of Acetone as a Solvent in Preparing the Official Resins," was presented by Edward T. Hahn. The author stated that acetone seemed to be specially adapted as a solvent for resinous materials, and that when applied to the drugs for the preparation of the above substances it readily penetrated them, and as a result percolation was more rapid than when alcohol was employed. Samples of resins prepared both with alcohol and with acetone were very similar in appearance.

Mr. James T. Shinn remarked upon the solubility of gun-cotton in acetone.

Dr. Lowe said that hardly any of the jalap found in the market of late years contained the amount of resin required by the Pharmacopœia, although he believed there was some improvement in this respect during the last two or three years.

With reference to the use of acetone as a solvent, Professor Trimble said that the lacquer which is used for brasswork is a solution of gun-cotton in amyl acetate, together with acetone, petroleum ether or wood alcohol.

Dr. Miller made a somewhat novel statement in reference to oil of bay. His attention had recently been directed to two grades of this oil, the one, the better quality, quoted at a certain price, and the other marked U. S. P., and having a lower price. Upon inquiry as to the cause of this state of affairs, it was found that eugenol had been added to the natural product to raise the specific gravity, and thus make the oil conform with pharmacopœial requirements.

"An Examination of Some Commercial Powdered Extracts of Licorice" was the subject of a paper read by Calvin O. Kinzey.

In comparing the results obtained by the author, the American extracts were found to be of better quality than either the Spanish or Greek extracts.

Mr. Alfred Mellor said that tobacco manufacturers are the largest consumers of extract of licorice, and that they use the following method for estimating the glycyrrhizin: Ten grammes of the extract are dissolved in 100 c.c. of water; 200 c.c. of alcohol are added, and the mixture allowed to stand twelve hours or over night. This precipitates insoluble matter, which is separated by filtration. The glycyrrhizin is then precipitated by adding sulphuric acid to the filtrate.

There being no further business, on motion, the meeting adjourned.

T. S. WIEGAND,
Registrar.

NOTES AND NEWS.

The *Seychelles vanilla* crop of 1896 was the largest that has ever been grown in the colony, amounting to 63,000 pounds, valued at about Rs. 936,000. The cultivation of vanilla in the colony dates back about twenty years, and is only now beginning to be thoroughly understood. The comparatively large output has given a fresh impetus to its cultivation, and a very large quantity has been planted. The Mexican system of allowing the vines to grow under trees, nearly wild, is at present in vogue, and is said to be a decided improvement on the old system of training the vines on artificial supports. The production of vanilla costs the planter Rs. 3 per pound, and the prices vary from Rs. 8 to Rs. 16 per pound. The average yield is about 200 pounds an acre, and land can be bought at from Rs. 100 to Rs. 200 the acre. Administrator Stewart regrets that Seychelles is almost a *terra incognita*, because he believes the colony offers advantages not to be met with elsewhere for the investment of small capital of, say, about £1,000.—*Pharmaceutical Journal*, November 27, 1897.

CLASSES

—OF THE—

PHILADELPHIA COLLEGE OF PHARMACY,

SEVENTY-SEVENTH ANNUAL SESSION, 1897-1898.

FIRST YEAR CLASS LIST.

Name.	*Place.*	*State.*	*Preceptor.*
Adam, Geo. Freshell,	Richmond,	Va.	Geo. Freshell.
Albright, Allen Enos,	Allentown,	Pa.	C. L. Shoemaker.
Allison, James Elmer,	Chambersburg,	Pa.	Cressler & Keefer.
Andrews, Wm. Hall,	Woodstown,	N. J.	Geo. W. Andrews.
Apple, Chas. Andrew,	Stroudsburg,	Pa.	F. M. Apple.
Austin, Chas. Howard,	Williamstown,	N. J.	Theodore Campbell.
Baker, Maineard Lesher,	Cowan,	Pa.	W. D. Heiser.
Barnes, Chas. Wesley,	Thomasville,	Ga.	Chas. S. Bondurant.
Beardsley, Edward John,	Hartford,	Conn.	Chas. A. Rapelje.
Beatty, Arthur Wm.,	St. Louis,	Mo.	H. C. Blair.
Bernhard, Hugo A.,	Canal Dover,	O.	J. W. Pfeiffer.
Bethel, John Percy,	Philadelphia,	Pa.	B. N. Bethel, M.D.
Bishop, Wm. H. Pancoast,	Carversville,	Pa.	J. H. Bishop, M.D.
Blew, Joseph Oscar,	Bridgeton,	N. J.	C. F. Dare & Son.
Borrowes, Geo. Henry,	Philadelphia,	Pa.	H. C. Blair.
Bosler, Harry Ellis,	Olean,	N. Y.	J. C. Welch.
Bowers, Howard Levin,	Easton,	Pa.	A. Lincoln Serfass.
Branin, Manlif Lewis,	Millville,	N. J.	Chas. B. McLoughlin.
Brennan, Ed. Vincent,	Plymouth,	Pa.	L. W. Rehbein.
Brookes, Jennie,	Waelder.	Tex.	
Brooks, Walter,	Quarryville,	Pa.	T. M. Rohrer, M.D.
Buckman, Wm. Watson,	Newtown,	Pa.	M. M. Buss.
Burchfield, Wm. Clinton,	Ashland,	Pa.	R. J. Williams.
Burr, Agnes Haworth,	Earlington,	Ky.	
Callahan, Samuel Irving,	Pennsville,	N. J.	W. H. Dunn.
Carey, Harris May,	Wyoming,	Del.	N. O. Harris.
Cartwright, Sanford Warren,	Fresno,	Cal.	
Cashman, Wylie Palmer,	Chambersburg,	Pa.	Cressler & Keefer.
Casperson, Henry Lyle,	Clayton,	Del.	T. C. Taylor & Co.
Connell, Francis Joseph,	Pottstown,	Pa.	Chas. A. Eckels.
Cook, Ernest Fullerton,	Waynesboro,	Pa.	Mentzer & Clugstan.
Corson, Thomas Clark,	Philadelphia,	Pa.	W. J. Scott.
Craig, Henry Douglas,	Mauch Chunk,	Pa.	J. W. Smith.
De Crow, Reaves Warren,	Utica,	O.	J. W Collins.
Dentler, Roy W.,	Turbotville,	Pa.	Frank W. Ely.
Desch, Edward Allen,	Fogelsville,	Pa.	C. J. Biddle.
Diehl, Andrew Thompson,	Carlisle,	Pa.	B. F. Emerick.
Dietz. Harry Edgar,	Lock Haven,	Pa.	George W. Mason.
Doake, Robert Stewart,	Philadelphia,	Pa.	Theodore Campbell.
Dobson, Leonard Stanley,	Philadelphia,	Pa.	C. L. Dobson.
Dooley, John Joseph,	Plymouth,	Pa.	George J. Durbin.
Dorman, Harry Milton,	Phœnixville,	Pa.	Wm. A Dorman.

Name.	*Place.*	*State.*	*Preceptor.*
Doughty, John Thompson,	Millville,	N. J.	E. M. Boring.
Doyle, Francis J.,	Salem,	N. J.	Edwin A. Trist, M.D.
Duffy, Thomas Anthony,	Carbondale,	Pa.	B. A. Kelly.
Early, Eugene,	Harrisburg,	Pa.	Forney & Knouse.
Eddy, Eugene Henry,	Lorain,	O.	J. H. Folkens.
Edwards, Manly Bruce,	Bloomsburg,	Pa.	Geo. P. Ringer.
Eldridge, Wm. Arthur,	Salem,	N. J.	Frank Luerssen.
Elwell, Ralston Fithian,	Bridgeton,	N. J.	C. F. Dare & Son.
Eshleman, Ellis Good,	Faggs Manor,	Pa.	W. H. Laubach, Jr.
Fabian, Asa,	Ottsville,	Pa.	R. H. Lackey.
Faunce, George Castor,	Philadelphia,	Pa.	T. W. Hargreaves.
Fenner, Harvey Albert,	So. Bethlehem,	Pa.	Campbell & Bro.
Fiet, John Jacob,	Philadelphia,	Pa.	Harvey J. Fiet, M.D.
Fisher, John Anthony,	Tremont,	Pa.	J. H. Schultz.
Foster, William Newell,	Philadelphia.	Pa.	Geo. F. Ralston, M.D.
Fox, Harry Terry,	Zanesville,	O.	Wm. M. Chappelear.
Franke, Louis,	Johnstown,	Pa.	C. G. Campbell.
Fretz, William,	Sabetha,	Kans.	R. T. Blackwood.
Fulton, Chauncey Curren,	York,	Pa.	W. L. Smyser.
Furst, Edgar Shuman,	Cedar Springs,	Pa.	H. C. Blair.
Garritt, Henry James,	Huron,	O.	J. M. Garritt.
Gibble, John Harry,	Manheim,	Pa.	Elmer E. Gibble, M.D.
Goodyear, Harry Jacob,	Cornwall,	Pa.	J. L. Lemberger.
Graff, George Wells,	Philadelphia,	Pa.	John B. Reynolds.
Greenberg, Jacob,	Novomirgorod,	Russia.	M. Peissakovitch.
Greenblatt, Max,	Philadelphia,	Pa.	Pinkas Rovno.
Griest, Joseph Taylor,	Peoria,	Ill.	W. M. Benton.
Guest, Wilbert Hillman,	Woodstown,	N. J.	Harry Guest.
Hampson, William Harvey,	Philadelphia,	Pa.	Frank F. Drueding.
Harmony, Edmund Franklin,	Allentown,	Pa.	Chas. S. Shoemaker.
Harrison, Charles,	East Liverpool,	O.	Chas. F. Larkins.
Hart, Lawrence Sylvester,	Philadelphia,	Pa.	
Hauber, Christian Henry,	Philadelphia,	Pa.	F. W. Haussmann.
Heinze, George Elmer,	Ashland,	Pa.	August Schoenenberger.
Hemberger, Paul Edward,	Dayton,	O.	John N. Prass.
Hilbish, John Henry,	Fredericksburg,	Pa.	J. C. Greisemer.
Hillebrand, William Gustav,	Philadelphia,	Pa.	Wm. N. Seary.
Hires, Lewis Moore,	Bridgeton,	N. J.	Reeve & Fithian.
Holloway, Paul Fendenberg,	Harrisburg,	Pa.	Holloway & Co.
Holmes, Frederick Cost,	Dover,	Del.	Andrew Blair & Co.
Housholder, Charles Edward,	Harrisburg,	Pa.	Frank S. Keet.
Huffer, Walter Craig,	Muncie,	Ind.	H. B. Morse.
Hughes, Harry Wilbert,	Millville,	N. J.	H. A. Volte.
Hunsinger, Merton Acto,	Forkston,	Pa.	
Irby, Moreland Russell,	Ashland,	Va.	N. Knight.
Jackson, Edward Farrel,	Wyoming,	Del.	J. B. Cook.
Jaeger, William Charles,	Philadelphia,	Pa.	Chas. H. Bohn.
Jelliff, Glenn Eli,	Mansfield,	Pa.	A. H. Elliott.
Kachline, Paul Hartzell,	Easton,	Pa.	John A. Weaver.
Kazanjian, Rupen Hagop,	Adana,	Armenia.	R. Hambleton, M.D.
Kelly, Edward Jaochin,	Philadelphia,	Pa.	G. G. Howard.
Kiefer, William Frederick,	Philadelphia,	Pa.	H. G. Comp & Co.
Kilgus, Harry Edward,	Renovo,	Pa.	Est. of M. L. Clay.
King, Lloyd Stanley,	Dayton,	O.	Wm. P. Graybill.
Landauer, Oscar,	Philadelphia,	Pa.	Theodore Sprissler, M.D.
Landis, Roger Levan,	Union Deposit,	Pa.	G. L. Carnan.
Lawn, John Thomas,	Philadelphia,	Pa.	F. W. E. Stedem.
Lawrence, John Whitaker,	Johnstown,	Pa.	C. F. Kirkendall.
Lee, Walter Estell,	Philadelphia,	Pa.	Wm. E. Lee.
Lehman, Samuel William,	Shippensburg,	Pa.	J. C. Altick & Co.

Name.	*Place.*	*State.*	*Preceptor.*
Lilly, Herbert George,	Chapman Quarries,	Pa.	John Horning.
Lintner, Edwin Windolph,	Millersville,	Pa.	
Lum, William Alvin,	Northeast,	Md.	F. E. Harrison.
McCaffry, Ward Bolon,	Berkeley Springs,	W. Va.	Thos. E. Hodgson.
McClure, Charles Nevin,	York,	Pa.	Alfred F. G. Hodnett
Mackey, Joseph Quarll,	Avondale,	Pa.	Lawson C. Funk.
Magee, Michael Vincent,	Conshohocken,	Pa.	Thos. F. McCoy.
Maier, Frank Joseph,	Woodbury,	N. J.	Alfred S. Marshall.
Malloy, Marvin Edward,	Indianapolis,	Ind.	J. Stephen Malloy, M.D.
Mauges, Willis Fastnecht,	Felton,	Pa.	G. W. Shoemaker & Co.
Marsland, John Williams,	Chester,	Conn.	Chas. Dickinson.
Mayes, William Rush,	Coleman,	Tex.	Coulson & Chadwell.
Meredith, Harry Lionel,	Hagerstown,	Md.	D. C. Aughinbaugh & Son.
Merz, Alfred William,	Würtemberg,	Germany.	E. W. Herrmann.
Meuser, Charles John,	Easton,	Pa.	Chas. Bachman.
Michael, George Albert,	Lebanon,	Pa.	Chas. E. Boyer.
Miles, James Barzillai, Jr.,	Helena,	Ark.	
Moeller, Carl Frederick,	Harrisburg,	Pa.	Dr. Hickman.
Morgan, Lulu Annette,	Scranton,	Pa.	
Morris, William Torrey, 2d,	Penn Yan,	N. Y.	T. F. Wheeler.
O'Donnell, Daniel Charles,	Shenandoah,	Pa.	P. W. Houck.
Ohliger, Willard,	Wooster,	O.	Zimmerman & Co.
Peiffer, Arthur,	Philadelphia,	Pa.	Steltz & Co.
Pile, Wilson Hunt,	Philadelphia,	Pa.	Gustavus Pile.
Popp, Andrew Ralph,	Reading,	Pa.	N. E. Cozen.
Pursel, Robert Clayton,	Bloomsburg,	Pa.	Moyer Bros.
Quinn, Francis Dennis,	Johnsonburg,	Pa.	
Rectenwald, Daniel Louis,	Pittsburg,	Pa.	Nelson Fry.
Reinhart, John Quigley,	Sheperdstown,	W. Va.	H. B Morse.
Rhoad, Irwin Bieber,	Kutztown,	Pa.	Funk & Groff.
Richards, Daniel Arthur,	South Easton,	Pa.	A. J. Odenwelder.
Ricketts, Clarence Emerson,	Kane,	Pa.	E. H. Watkins.
Russell, Walter Harold,	Coatesville,	Pa.	Geo. W. Davy.
Ryan, William Thomas,	Honesdale,	Pa.	R. Duane Reed.
Saurman, James S.,	Norristown,	Pa.	Baker & Grady.
Schad, Frank Casper,	Tamaqua,	Pa.	L. J. Steltzer.
Schenkel, William Henry,	Stuttgart,	Germany.	
Schmidt, Oscar Carl,	Philadelphia,	Pa.	G A. Barwig.
Scott, John Calvin,	Hamburg,	Pa.	A. J. Fink.
Scott, Levi,	Camden,	Del.	Wilkinson & Wilkinson.
Seabold, Henry Adam Fahnestock,	Annville,	Pa.	W. S. Seabold.
Seip, Charles Louis,	Philadelphia,	Pa.	Joseph Crawford.
Settle, Peter Smith,	Philadelphia,	Pa.	T. H. Price, M.D.
Seward, Frank Gates,	Norwich,	N. Y.	Norwich Pharmacal Co.
Shane, Samuel,	Moscow,	Russia.	J. T. Van Burkalow.
Sheffer, William Walter,	Dillsburg,	Pa.	Lawson C. Funk.
Sheppard, Henry Christopher,	Philadelphia,	Pa.	Howard B. French.
Shoffner, John Perry,	S. Bethlehem,	Pa.	Thos. H. Potts, M.D.
Siegle, Herman Christian,	Peoria,	Ill.	A. W. H. Reen.
Smiley, Frances Jane,	Philadelphia,	Pa.	Susan Hayhurst, M.D.
Smith, Wellington Gordon,	Lykens,	Pa.	S. B. Schminky.
Speck, Herbert Arthur,	Bethlehem,	Pa.	Geo. P. Kressler.
Stacks, Abraham Homer,	York,	Pa.	J. C. Perry.
Stein, Joseph Paul,	Philadelphia,	Pa.	Crumbie Bros.
Stinson, William Samuel,	Titusville,	Pa.	Geo. B. Evans.
Stolz, Louis,	Syracuse,	N. Y.	Geo. E. Thorpe.
Stone, Edward Browning,	Camden,	N. J.	Wm. Shafer, M.D.
Stout, Benjamin Franklin,	Quakertown,	Pa.	N. S. Stiltzer.
Sullivan James Francis,	Hartington,	Neb.	J. G. Beste.
Sunday, Carlton Pierce,	York,	Pa.	R. Wm. Ziegler.

Name.	*Place.*	*State.*	*Preceptor.*
Tanzola, Angelo,	Hammonton,	N. J.	V. Michelotte.
Taylor, Lynwood S.	Spring City,	Pa.	W. Carroll Taylor.
Timmins, Carroll Edwin,	Gettysburg,	Pa.	James Huston.
Tucker, Robert Woodliff,	Bermuda Islands.		J. K. Freeman.
Wenner, Harvey Eugene,	Allentown,	Pa.	A. R. Hesske.
Werts, John Lamont,	Renovo,	Pa.	John F. Neely.
Wetherill, Henry Emerson, M.D.,	Peabody,	Mass.	
Whitall, Edwin Clark,	Woodbury,	N. J.	R. W. Cuthbert.
Wilkinson, Harry,	Philadelphia,	Pa.	R. Powers Wilkinson.
Williams, Joseph James,	Conshohocken,	Pa.	Geo. L. Carman.
Wilson, George Cookman, Jr.,	Reading,	Pa.	J. C. Sanderson.
Witman, Charles Daniel,	Middletown,	Pa.	J. W. Rewalt.
Witmeyer, Samuel David,	Lebanon,	Pa.	Shinn & Baer.
Young, Alexander, Jr.,	Jenkintown,	Pa.	Samuel C. Henry.
Young, Edwin Henry,	S. Bethlehem,	Pa.	Cyrus Jacoby.
Zeller, Harry Lewis,	Tremont,	Pa.	R. T. Blackwood.

SECOND YEAR CLASS LIST.—1897–98.

Name.	*Place.*	*State.*	*Preceptor.*
Allen, Milton Deronda,	Medford,	N. J.	D. W. Fleming.
Andrews, Willard Crandall,	Cortland,	O.	W. C. Andrews.
Anstock, Arthur David,	Mahanoy City,	Pa.	Louis Oliphant.
Arnott, William,	Wilmington,	Del.	Jos. P. Williams.
Aughinbaugh, John Keely,	Greenvillage,	Pa.	Eberly Bros.
Bachman, Herbert Keck,	S. Bethlehem,	Pa.	Luther Gerhard.
Ball, Clifford Arthur,	Hellertown,	Pa.	Ellwood Ball, dec'd.
Balliet, Howard Paul,	Allentown,	Pa.	J. P. Frey.
Bamford, Melvin William,	Reading,	Pa.	R. Powers Wilkinson.
Barnett, Eldredge Ewing,	Cape May City,	N. J.	D. C. Guthrie, M.D.
Bayles, John Wickoff,	Moorestown,	N. J.	A. J. Durand.
Bear, Benj. S. J., V.M.D.,	Mount Joy,	Pa.	Chas. H. Jennings.
Beddow, Llewellyn Jenkins,	Mahanoy City,	Pa.	M. R. Stern.
Blankemeyer, Henry John, Jr.,	Philadelphia,	Pa.	Kennedy & Burke.
Booth, John Henry,	Philadelphia,	Pa.	Long & Co.
Bulger, Walter John,	Conshohocken,	Pa.	J. H. Kerr.
Chalquest, Gustave Emil,	Morristown,	N. J.	E. A. Carrell.
Chamberlain, Lowell Holbrook,	Des Moines,	Iowa.	Irving C. Wood, M.D.
Chamberlin, William Allen,	Indianapolis,	Ind.	Frank Morse.
Clark, John Edward,	Lock Haven,	Pa.	W. C. Franciscus & Co.
Cockroft, David Holliday,	Philadelphia,	Pa.	A. F. Hollopeter.
Crain, Charles Edward,	Springfield,	O.	G. & S. Coblentz.
Crawford, Horace Victor,	Laurelton,	Pa.	E. F. Menger.
Culby, Walter Gibson,	Philadelphia,	Pa.	L. A. Breidinger.
Curtis, Henry,	Minneapolis,	Minn.	O. J. Thompson, M.D.
Davis, B. K.,	St. Joseph,	Mo.	Muswick & Co.
Davis, Benjamin Winter,	Camden,	N. J.	G. L. Geiger & Co.
Davis, Samuel Bond,	Bridgeton,	N. J.	Reeve & Fithian.
Diehl, George Edward,	Charlestown,	W. Va.	Light & Mason.
Dixon, John Glaspey,	Salem,	N. J.	J. H. Lock, M.D.
Doherty, Harry Aloysius,	Atlantic City,	N. J.	F. E. Post.
Donnelly, Clarence Eugene,	Bridgeton,	N. J.	Frederick Seitz, M.D.
Doubler, George Hougan,	Milton,	Pa.	W. H. Galbreath.
Dunn, Edwin Alfred,	Meadville,	Pa.	P. Henry Utech.
Egel, Frederick William,	Bound Brook,	N. J.	Chas. L. Manning.
Engler, Robert Saylor,	Temple,	Pa.	John B. Raser.
Falkenhainer, Charles,	Guttenberg,	Ia.	James Hervey.
Faulhaber, Gustave Adolph,	Loudenville,	O.	G. A. Appenzeller.

Name.	*Place.*	*State.*	*Preceptor.*
Fishburne, Richard Lewis,	Lock Haven,	Pa.	Andrew Blair & Co.
Fleming, Arthur Bowles,	Chambersburg,	Pa.	J. L. Barnitz.
Gasslein, Richard Joseph,	Philadelphia,	Pa.	James J. Ottinger.
Gillan, Charles McDowell,	Chambersburg,	Pa.	P. B. White.
Grady, William Patrick,	Philadelphia,	Pa.	F. W. E Stedem.
Gruel, John Edward,	Lancaster,	Pa.	John C. Long, dec'd.
Gryning, John Francis,	Philadelphia,	Pa.	Geo. B. Evans.
Hammond, Nathan Brown,	West Chester,	Pa.	Arthur B. Hammond.
Hance, Howard Ivins,	Philadelphia,	Pa.	R. A. Hance.
Hannum, John Lewis,	Media,	Pa.	W. E. Dickeson.
Harrison, Walter B.,	McKeesport,	Pa.	J. C. Smith.
Hartman, Henry Loekle,	Lebanon,	Pa.	Dr. Geo. Ross & Co.
Harvey, Charles John,	Butler,	Pa.	D. H. Wuller.
Heckman, John George,	Meadville,	Pa.	J. G. Lindeman.
Heineberg, Alfred,	Selma,	Ala.	Selma Drug Co.
Hesse, Frederick William,	Savannah,	Ga.	Reid & Co.
Hetrick, Harry Leady,	Altoona,	Pa.	W. M. C. Craine.
Heyl, Charles Ambrose,	Philadelphia,	Pa.	P. M. Kelly, M.D.
Hicks, George Wellington,	Trenton,	N. J.	A. D. Cuscaden.
High, Raymond,	Norristown,	Pa.	W. M. Rickert.
Hill, George Price,	Lansford,	Pa.	Wm. M. Hill.
Hoagland, Robert John,	Peoria,	Ill.	B. G. Clapham.
Hoch, Quintus,	Nazareth,	Pa.	Aquila Hoch.
Holland, Albert J. F.,	Philadelphia,	Pa.	Geo. Holland, M.D.
Holt, Edwin Merrimon,	Goldsboro,	N. C.	C. B. Miller.
Hostetter, Harry Jacob,	Reading,	Pa.	Harry Bitler.
Hottenstein, Peter David,	Kutztown,	Pa.	C. F. Wild.
Hunt, Earl Robert,	Bethlehem,	Pa.	H. G. Kalmbach.
Huzzard, Kurtz,	Norristown,	Pa.	Eugene Fillman.
Jackson, Charles Henry,	Salem,	N. J.	Harry Lippen.
James, Arthur Bernstein,	Kingston,	N. Y.	M. J. Wohlgemuth.
Jenkins, David Evans,	Danville,	Pa.	J. D. Gosh & Co
Kaderly, Eugene John,	New Philad'a,	O.	Opes & Thompson.
Keiser, Frederick,	Milton,	Pa.	C. Carroll Meyer.
Kemp, Lucian Scott,	Dayton,	O.	Justus Schmidt.
Kimberlin, Frederick William,	Norristown,	Pa.	Chas. B. Ashton.
Kincaid, Raymond Keck,	Allentown,	Pa.	Harvey L. Kieper.
Kintzer, Harry Augustus,	Womelsdorf,	Pa.	F. T. Landis.
Klusmeyer, Henry Chester,	Easton,	Pa.	F. L. Mebus.
Koch, Christopher, Jr.,	Philadelphia,	Pa.	C. A. Eckels.
Kraus, Wm. Fred. Constance,	Philadelphia,	Pa.	Otto Kraus.
Krehl, Benjamin,	Buffalo,	N. Y.	T. W. Reuting.
Lacy, Burdett Seldon,	Gloucester City,	N. J.	Wm. E. Lee.
Lauer, Julius Paul,	Millersville,	Pa.	Chas. E. Keeler.
Lefever, John Matthew,	York,	Pa.	S. M. Gable.
Lehman, George Theodore,	Portsmouth,	O.	Frederick Radefeld.
Lock, William,	Philadelphia,	Pa.	H. J. Batdorff.
Love, Thomas B.,	Philadelphia,	Pa.	Bullock & Crenshaw.
McClintock, Theodore Brown,	Jamestown,	N. Y.	Hatch & Briggs.
McClure, Richard Ferris,	Wilmington,	Del.	F. R. Smith, M.D.
McCollin, James Garrett,	Philadelphia,	Pa.	J. M. Wert, M.D.
McCoy, James Edward,	New York,	N. Y.	Howard G. Shinn.
McDonnell, Joseph Francis,	Centralia,	Pa.	G. W. Davis.
McElwain, William Thomas,	Chambersburg,	Pa.	Cressler & Keefer.
McFall, John Allen,	Charlestown,	S. C.	Henry M. Minton.
McGuire, Thomas Edward,	Mahanoy City,	Pa.	Shenandoah Drug Store.
McKeever, William Henry,	Philadelphia,	Pa.	
MacMurray, Annie,	Upland,	Pa.	Wm. H. Farley.
MacPherran, Ivan LeRoy,	Pittsburg,	Pa.	M. M. Dunham.
Mattison, Richard Van S., Jr.,	Ambler,	Pa.	Richard V. Mattison.

Name.	*Place.*	*State.*	*Preceptor.*
Meister, Samuel Emil,	Lancaster,	Pa.	W. D. Chandler.
Mervine, Graydon Duncan,	Milton,	Pa.	J. S. Follmer, M D.
Mitchel, Edward Waldo,	Philadelphia,	Pa.	E. R Gatchel.
Mooney, Frank,	Philadelphia,	Pa.	Fred. Schwartz, M.D.
Moury, Joseph Daniel,	Shamokin,	Pa.	
Mutty, William Clement,	S. Brewer,	Me.	F. W. E. Stedem.
Nicklas, David Edward,	Chambersburg,	Pa.	J. L. Barnitz.
Norris, Clarence Augustus,	Manasquan,	N. J.	Andrew Blair.
Orf, George Marion,	Philadelphia,	Pa.	J. J. Finney.
Osterlund, Otto William,	Kinekulle,	Sweden.	Theodore Campbell.
Patrick, William Smith,	Salem,	N. J.	W. H. Dunn.
Peck, William G.,	Nottingham,	England.	O. H. Sterner, M.D.
Pettebone, Thomas J.,	Dorranceton,	Pa.	C. W. Spayd, M.D.
Pflieger, Ellwood Keech,	York,	Pa.	Dale, Hart & Co.
Phillips, John Henry,	Redfield,	N. Y.	W. H. Phillips.
Potts, Samuel Lawrence,	Newtown,	Pa.	Edwin F. Hellyer.
Price, Arthur Chew,	Wilmington,	Del.	Jos. C. Roberts.
Radefeld, Robert,	Philadelphia,	Pa.	Fred. Radefeld.
Raines, Edward Lee,	Memphis,	Tenn.	James S. Robinson.
Ranck, David Walter,	Philadelphia,	Pa.	J. W. Ranck, M D.
Reice. William,	Bloomsburg,	Pa.	James H. Mercer.
Reigel, M. Calvin,	Linglestown,	Pa.	Geo. B. Evans
Reinhart, Robert Lucian,	Sheperdstown,	W. Va.	S. S. Loughridge.
Rhoads, Robert Elliott,	Reading,	Pa.	I. J. Brandt.
Roessner, Benjamin,	Philadelphia,	Pa.	D. Milligan.
Rogers, Edward Bancroft,	Mt. Holly,	N. J.	E. D. Prickett.
Ross, Dell Noblitt,	Rosemont,	Pa.	Frank W. Prickett.
Rossell, Edward Wood,	Pemberton,	N. J.	Austin R. Haines.
Ryan, William Stephens,	Philadelphia,	Pa.	A. D. Forrest.
Sample, James Turner,	Roaring Springs,	Pa.	C. J. Biddle.
Saylor, Byron Centennial,	Annville,	Pa.	E. Warg.
Schwaemmle, Fred. Philip,	Philadelphia,	Pa.	E. H. Fienhold.
Seitz, John Alphonsus,	Wilmington,	Del.	Z. James Belt.
Seubert, Charles Aloysius,	Lebanon,	Pa.	John F. Loekle
Shannon, Samuel Coward,	Philadelphia,	Pa.	D. M. Harris.
Shapiro, Henry,	Vitebsk,	Russia.	F. W. E. Stedem.
Sheehan, William Henry,	Dallas City,	Pa.	H. M. Campbell.
Shirey, Orville Ludwig,	Chambersburg,	Pa.	Cressler & Keefer.
Simcox, Howard Leon,	Philadelphia,	Pa.	Geo. W. Bowen, M.D.
Sipes, Clarence Leslie,	McConnellsburg,	Pa.	Chas. Leedom.
Sleifer, Jay Ward,	Bingham,	Pa.	J. A. Wamsley.
Smith, Chas Ellwood Rupert,	Philadelphia,	Pa.	Shoemaker & Busch.
Smith, George Carroll,	Pottstown,	Pa.	Chas. A. Smith.
Snyder, Herman Hugo,	Philadelphia,	Pa.	Frank C. Davis.
Stahlé, Robert Nevin,	Gettysburg,	Pa.	H. A. Borell.
Stancill, George Walter,	Selma,	N. C.	G. T. Williams.
Stang, Peter,	Philadelphia,	Pa.	Henry Mueller, M.D.
Steel, Chalmers Alexander,	Huntingdon,	Pa.	H. E. Steel.
Stern, Wilson Clinton Ammon,	S. Bethlehem,	Pa.	D. Bruce Richards, M.D.
Stout, Philip Samuel,	Quakertown,	Pa.	Oliver Stout.
Strode, Clark,	Philadelphia,	Pa.	Funk & Groff.
Suhn, Minnie,	Vitebsk,	Russia.	M. Peissakovitch.
Turner, Joseph Constant,	Philadelphia,	Pa.	W. F. Steinmetz.
Van Dyke, James Wilber,	Hightstown,	N. J.	H. G. Rue.
Wagner, Charles,	Philadelphia,	Pa.	Julian Fajans, M.D.
Watson, James Nathaniel,	Elizabethtown,	Pa.	H. C. Blair.
Weakley, William Stair,	York,	Pa.	J. J. Weakley.
Wehn, Clyde Edwards.	Johnstown,	Pa.	Chas. Young.
West, Katherine Powell,	Norristown,	Pa.	Jos. C. Roberts.
Wolf, Charles August,	Philadelphia,	Pa.	L. S. A. Stedem.

Name.	*Place.*	*State.*	*Preceptor.*
Wright, John Franklin,	Canon City,	Col.	Hunter Palmer.
Wyckoff, Elmer Le Roy,	Ithaca,	N. Y.	Fred. H. Blackmer.
Young, Annie Hawkins,	Henderson,	N. C.	Geo. B. Evans.
Zeller, Earl Emanuel,	Mifflinburg,	Pa.	James Klackner.
Ziegler, Chester Winsor,	Gettysburg,	Pa.	Shinn & Baer.

THIRD YEAR CLASS LIST, 1897–98.

Name.	*Place.*	*State.*	*Preceptor.*
Abrams, Frederick Arthur,	Philadelphia,	Pa.	John Wyeth & Bro.
Albert, Henry Clay,	Maysville,	Ky.	
Albright, Charles Henry,	Philadelphia,	Pa.	J. P. Frey.
Baer, Lemuel Miles,	Lancaster,	Pa.	Breidinger & Comber.
Bartholomew, Arthur,	Philadelphia,	Pa.	J. M. Higgins.
Beane, George Ridenour,	Bainbridge,	Pa.	H. C. Blair.
Berberich, Herman,	Stein,	Germany.	James Moffet, Jr.
Berry, Robert Taylor,	Charlestown,	W. Va.	T. H. Franklin.
Beyerle, Charles Wellington,	Bernville,	Pa.	Wm. C. Rowe.
Bishop, David Kerlin,	Patterson,	Pa.	W. G. Nebig.
Black, Robert Morris,	Philadelphia,	Pa.	Geo. B. Maurer.
Bloor, Alfred Wainwright,	Manor,	Texas.	
Booth, Thomas,	Philadelphia,	Pa.	Alexander Wilson.
Brach, Cornelius,	Kerzenheim,	Germany.	W. E. Miller, M.D.
Bradford, Edward Burton,	Newport,	N. J.	A. LaDow.
Bready, William Ramsey, Jr.,	Philadelphia,	Pa.	A. J. Frankeberger.
Brewton, Swain Hoffman,	Cape May City,	N. J.	William Porter.
Brown, Hampton Houseman,	Pleasant Grove,	Pa.	B. L. Brown, M.D.
Buckingham, Harry Sheldon,	Clayton,	N. J.	Howard G. Shinn.
Cassel, Oscar Heebner,	Lafayette Hill,	Pa.	
Cohen, John Thomas,	Chester,	Pa.	R. H. Henderson.
Coleman, John Edward,	Carbondale,	Pa.	B. A. Kelly.
Cooper, Walter Greenlee,	Savannah,	Mo.	J. P. Cooper.
Cox, Linwood,	Norristown,	Pa.	Atwood Yeakle.
Cunningham, Orrick Sim,	Clear Spring,	Md.	Geo. W. Hurd.
Dale, David,	Philadelphia,	Pa.	John Wyeth & Bro.
De Beust, William Hare,	Philadelphia,	Pa.	R. H. De Beust.
Decker, William Robert,	York,	Pa.	S. E. R. Hassinger.
DeHaven, Ida Valeria,	Bayonne,	N. J.	Dennis J. Gerrity.
Dirmitt, Charles Walter,	Philadelphia,	Pa.	Chas. H. Dirmitt.
Downing, William Henry,	Wilmington,	Del.	N. B. Danforth.
Dubell, Alexander,	Mt. Holly,	N. J.	R. C. Barrington.
Estlack, Walter Forrest,	Philadelphia,	Pa.	H. W. Estlack.
Evans, Abner Thomas,	Greenburg,	Pa.	S P. Brown.
Evans, Samuel, Jr.,	Circleville,	O.	Evans & Kimmel.
Farrow, Frederick Reeves,	Leipsic,	Del.	Eberly Bros.
Fisher, Samuel Keim,	Leesport,	Pa.	James C. Brobst, M.D.
Foltz, Edgar Daniel Grant,	Bethlehem,	Pa.	J. H. Spruance.
Friebely, Harry Eugene,	So. Bethlehem,	Pa.	H. A. Burkhart, M.D.
Funk, Robert Rowland,	Hagerstown,	Md.	Blew & Lucas.
Gibb, Andrew,	Lock Haven,	Pa.	W. C. Franciscus.
Gladhill, James White, M.A.,	Jersey Shore,	Pa.	Geo. M. Beringer.
Greer, Mary C.,	Philadelphia,	Pa.	May Reynolds.
Groff, Harry Musselman,	Lancaster,	Pa.	C. W. Warrington.
Grunden, Percival Edward,	Steelton,	Pa.	G. A. Gorgas.
Guth, Herbert Wallace,	Allentown,	Pa.	Peters & Smith.
Haus, Ralph Leonard,	Mifflinburg,	Pa.	W. H. F. Vandegrift.
Heintzelman, Joseph August,	Philadelphia,	Pa.	J. A. Heintzelman.
Heverly, Frederick Chase,	Wilkesbarre,	Pa.	R. D. Williams.

Name.	*Place.*	*State.*	*Preceptor.*
Hoffman, William Anton,	Renovo,	Pa.	E. T. Swain.
Huntington, Joseph,	Philadelphia,	Pa.	J. C. Perry.
Jenkins, Frank Heiston,	Hanover,	Pa.	J. L. Emlet.
Joffe, Jacob Leopold,	Kovno,	Russia.	E. J. Lupin.
Kain, John Kauffman,	York,	Pa.	J. B. Kain, M.D.
Keen, George Carll,	Vineland,	N. J.	J. J. Ottinger.
Keen, George Samuel Jacob,	Wiconisco,	Pa.	C. D. Christman, M.D.
Keenan, John Joseph,	Philadelphia,	Pa.	J. J. Burke, M.D.
Keim, Joseph Paxson,	Bristol,	Pa.	E. Martin.
Kepner, Weldon Stover,	Shippensburg,	Pa.	J. C. Altick & Co.
King, James David,	Easton,	Pa.	Rowland Willard.
Kirby, Frank Brennand,	Philadelphia,	Pa.	Lawson C. Funk.
Krewson, William Egbert, Jr.,	Philadelphia,	Pa.	Wm. E. Krewson.
Kyser, George Herbert,	Richmond,	Ala.	Geo. W. Kyser.
Latchford, Orwan Luther,	Markelsville,	Pa.	D. H. Ross.
Lee, Walter Evan,	Vineland,	N. J.	Bidwell & Co.
Lerch, William Abraham,	Allentown,	Pa.	Peters & Smith.
Levy, Joseph Jacob,	Philadelphia,	Pa.	J. H. B. Amick, M.D.
Lindig, Charles Warren,	Lewisburg,	Pa.	Harry N. Hoffman.
Luebert, August Gustav,	Philadelphia,	Pa.	David A. Over.
MacBride, William Vaughan,	Philadelphia,	Pa.	W. F. Seiler.
McCleary, Harry Walter,	Pinegrove Furnace,	Pa.	J. E. Sipe.
Mathers, Grace,	Philadelphia,	Pa.	Susan Hayhurst, M.D.
Metzler, Walter Scott,	Baltic,	O.	A. S. Metzler, M.D.
Middleton, Claude Ruoff,	Philadelphia,	Pa.	Shinn & Baer.
Miller, William Frederick,	Erie,	Pa.	William Fisher.
Mills, John Leopold,	Cardington,	O.	A. C. Schofield.
Monaghan, Thomas Francis,	Philadelphia,	Pa.	H. D. Stichter, M.D.
Monroe, William Robeson,	Fresno,	Cal.	Geo. H. Monroe.
Morell, Charles Joseph,	Philadelphia,	Pa.	Chas M. Morell.
Morgan, Frank William,	New Orleans,	La.	William Greve.
Mountain, Lloyd Lott,	Confluence,	Pa.	W. S. Mountain, M.D.
Ney, Howard Jacob,	Harrisburg,	Pa.	Chas. F. Kramer.
Parse, Andrew Connet,	Flemington,	N. J.	J. Sherman Cooley.
Perse, James Woodlock,	Plymouth,	Pa.	James V. Perse.
Preston, Gilbert Kent,	Philadelphia,	Pa.	David Preston.
Putt, Milton Thomas,	Lebanon,	Pa.	W. B. Means M.D.
Raker, John Wilson,	Pillow,	Pa.	Chas. H. Tatem, dec'd.
Richardson, James,	Pickering,	Ontario.	George Y. Wood.
Ringer, Louis Johnson,	Hagerstown,	Md.	M. L. Byers & Co.
Rinker, Henry Paul,	Hellertown,	Pa.	C. W. Albright.
Ritz, Charles August,	Ashland,	Pa.	A. Schoenenberger.
Roberts, DeWilton Smith,	Philadelphia,	Pa.	M. A. Hull.
Rose, Frank,	Philadelphia,	Pa.	P. Fitch, M.D.
Ross, Annie Catherine,	Philadelphia,	Pa.	F. W. E. Stedem.
Schlauch, Theodore Storb,	New Holland,	Pa.	C. J. Seltzer.
Seiberling, Joseph Dallas,	Hynemansville,	Pa.	Frank Morse.
Sheitz, Lloyd A.,	York,	Pa.	Harry A. Hay.
Shemp, Russell Nicholas,	Philadelphia,	Pa.	W. E. Supplee & Bro.
Shwab, George Augustus,	Nashville,	Tenn.	
Sieber, Isaac Grafton,	Harrisburg,	Pa.	J. Wilson Hoffa.
Slobodkin, Rose,	Minsk,	Russia.	Susan Hayhurst, M.D.
Smith, Alfred Homer,	Smyrna,	Del.	Wm. F. Dunn.
Smith, Benjamin James,	Trenton,	N. J.	Aquila Hoch.
Snavely, Clarence Osborne,	Lebanon,	Pa.	Wm. G. Shugar.
Snyder, John Paul,	Lancaster,	Pa.	W. T. Hoch.
Steinmetz, William Baer,	Ephrata,	Pa.	G. S. Royer.
Stimus, Howard George,	Moorestown,	N. J.	G. H. Wilkinson.
Stott, Ho·atio Allen,	Coatesville,	Pa.	W. S. Young.
Strawinski, Jacob Franklin,	York,	Pa.	Dale, Hart & Co.

Name.	*Place.*	*State.*	*Preceptor.*
Swartley, Harry Mahlon,	Philadelphia,	Pa.	F. P. Streeper.
Thompson, Henry Kirk,	Titusville,	Pa.	R. C. Cadmus.
Thompson, Harry Merril,	Selins Grove,	Pa.	T. C. Tomlinson.
Tomlinson, George Walton,	Feasterville,	Pa.	L. H. Lewis.
Troth, Ernest Augustine,	Palmyra,	N. J.	Shoemaker & Busch.
Tyler, William Walston,	Onancock,	Va.	Geo. B. Evans.
Underwood, James Harris,	Woodbury,	N. J.	Campbell & Bro.
Waldner, Herman Theodore,	Ashland,	Pa.	T. H. Strouse.
Walter, William Bell,	Gettysburg,	Pa.	H. C. Blair.
Wilt, George Washington, Jr.,	Flemingsburg,	Ky.	John J. Reynolds.
Winkler, Oscar Charles,	Philadelphia,	Pa.	M. S. Apple.
Winslow, John Hayes,	Vineland,	N. J.	A. C. Taylor.
Zane, William Spence,	Williamstown,	N. J.	G. B. Minton.

SENIOR CLASS LIST.—1897–98.

Name.	*Place.*	*State.*	*Preceptor.*
Brookes, Lulu,	Waelder,	Texas.	J. M. & J. C. Henderson.
Clark, Robert Hall,	Union City,	Ind.	A. LaDow & Co.
Cornell, Horace Hogeland,	Newtown,	Pa.	Robert Glenk.
Entwistle, Albert Henry,	Philadelphia,	Pa.	Chas. H. Roberts.
Failing, William Clark,	Palatine Bridge,	N. Y.	H. C. Blair.
Filer, Burritt Boynton,	Hammonton,	N. J.	J. Frank Meade, M.D.
Fleming, John Halbert,	Collamer,	Pa.	A. W. Smedley, dec'd.
Hebden, William,	Philadelphia,	Pa.	Caleb Scattergood.
Howard, Horace Emory,	So. Hadley,	Mass.	J. J. Ottinger.
Jacoby, William Lawless,	Philadelphia,	Pa.	Bullock & Crenshaw.
Jaeger, Charles Frederick,	Philadelphia,	Pa.	E. E. Bostick.
Jolley, John James,	Pottsville,	Pa.	Frank M. Apple.
Koehler, George,	Philadelphia,	Pa.	E. F. Kaempfer.
Konover, Harold Doble,	Trenton,	N. J.	D. W. Baker.
Langham, John Williams,	Philadelphia,	Pa.	E. Bryan Kyle, M.D.
Lincoln, George Washington,	Philadelphia,	Pa.	Howard G. Shinn.
Malin, George Lawrence,	Atlantic City,	N. J.	W. Wright, M.D., dec'd.
Morse, Thomas,	Montgomery,	Ala.	H. G. Eakin
Pasold, Julius Martin,	Joliet,	Ill.	H. F. Voshage.
Peterson, Walter Vickerstaff,	Philadelphia,	Pa.	C. W. Shull.
Smith, Justin Tone,	Windsor,	Vt.	W. A. Rumsey.
Toelke, Charles,	Philadelphia,	Pa.	Frank E. Morgan.
Weber, Howard Elmer,	Mahanoy City,	Pa.	M. R. Stein.
Weiss, Hervey Beale,	Philadelphia,	Pa.	Bullock & Crenshaw.
Wells, James Ralston, Jr.,	Philadelphia,	Pa.	Bullock & Crenshaw.
Yates, John Julius, Jr.,	Wilmington,	Del.	H. K. Watson.

LIST OF SPECIAL STUDENTS.—1897–98.

Name.	*Place.*	*State.*	*Department.*
Cheney, Millwood C.,	Brooklyn,	N. Y.	Chemistry.
Clement, Adolphe Ernest,	Montreal,	Canada.	Phar. and Chemistry
Corse, Montgomery Beverly,	Lexington,	Va.	Phar. and Botany.
Dirmitt, Charles Walter,	Philadelphia,	Pa.	Chemistry.
Graves, Nelson Zuinglius, Jr.,	Philadelphia,	Pa.	Chemistry.
Hatch, Arthur Joseph,	Overbrook,	Pa.	Chemistry.
Heckeroth, William Conard,	Philadelphia,	Pa.	Chemistry.
Hoft, William Irving,	Philadelphia,	Pa.	Chemistry.
Kinzey, Calvin Otto,	Cumberland,	Md.	Chemistry.

Name.	*Place.*	*State.*	*Department.*
Lowe, Elsie Morgan,	Philadelphia,	Pa.	Botany.
McCracken, John Alwine,	Philadelphia,	Pa.	Chemistry.
Masters, Harry O.,	Thomaston,	Me.	Chemistry.
Matusow, Harry, Ph.G.,	Minsk,	Russia.	Chemistry.
Monahan, Frank,	Titusville,	Pa.	Chemistry.
Post, Edward Meigs, Ph.G.,	S. Seaville,	N. J.	Chemistry.
Preston, Gilbert Kent,	Philadelphia,	Pa.	Chemistry.
Rowe, William C., Ph.G.,	Philadelphia,	Pa.	Chemistry.
Suhr, Charles Louis,	Oil City,	Pa.	Chemistry.
Toplis, William G., Ph.G.,	Philadelphia,	Pa.	Chemistry.
Warner, William James,	Philadelphia,	Pa.	Chemistry.
Whipple, Oscar K.,	Bridgeton,	N. J.	Chemistry.
Wirth, Adam,	New Orleans,	La.	Chemistry.

A GINGER PEELER.

THE AMERICAN

JOURNAL OF PHARMACY

FEBRUARY, 1898.

IN THE LAND OF GINGER—JAMAICA.

By F. B. Kilmer.

The books state that "Zingiber officinale, Roscoe (Amomum zingiber), is a native of Asia, and that it has been introduced into most tropical countries, and is now found in the West Indies, South America, tropical western Africa, and Queensland in Australia." But the vial handed over the drugstore counter, even though it may contain a weak decoction of pepper, will invariably be labeled "Jamaica Ginger." In these notes we shall, therefore, study this plant as seen in its popular habitat, thus keeping in sympathy with the West India planter, to whom the only known spot where ginger grows is in his sunlit garden.

In the track of the ocean steamers sailing from New York or Liverpool toward the southern continent, as they pass from the cold grey waters of the Atlantic into the warm blue waters of the Caribbean Sea, at a point in the windward passage 100 miles west of San Domingo, 90 miles south of Cuba, lies Jamaica. Donnely created his island of "Atlantis" in these waters. Assuming his story to be true, St. Jago, the gem of the Antilles—Ginger Land—is a favorable location for his Eden. By a vivid imagination we might, from the present inhabitants, trace a lineage back through Ham, and arrive at a picture of Adam planting ginger in the first garden. As the traveler approaches Ginger Land he is impressed with the magnificence and beauty he sees outlined against a perfect sky, terrace upon terrace of mountains upon mountains spring into

view, dark purple mountains, rent by fissures, jutting into the blue heavens. The shores are covered with lively green down to the water's edge; here and there a white spot, completely embowered in foliage, marks the plantations and settlements. Columbus formed a relief map of this island for his queen by crumpling a piece of paper in his hand. The landscape of Ginger Land is truly crumpled but picturesque, and the ginger plant grows luxuriantly on the steep sides of its crumpled elevations, from 2000 feet up to the lofty summits of the blue mountain range. In gorges, in romantic glens, sinks, cockpits, valleys, through the ages there has been deposited a rich, humus soil, this is drained by innumerable streams, along the banks of which, among everblooming tropic flowers, ginger finds a congenial habitat.

One of the essential requirements for the growth of this plant is sunshine—Old Sol is here young, bright and active.

Another requisite for growth—moisture—is also here in plenty. In some portions, 281 inches, or 23 feet, is recorded as an annual downpour. In the "ginger district," 88 inches, or over 7 feet, has been the mean annual rainfall for the last twenty years. (In a report made by one of my correspondents in this district, October, 1897, 47 inches, or nearly 4 feet, of rainfall were recorded in sixteen days.) While ginger grows at suitable elevations all over the island, it is mainly produced in the central western portion, along the borders of the parishes of Westmoreland, St. Elizabeth, Manchester, Clarenden, Trelawney and St. James. The underlying soil of this district consists of white and yellow limestone, with trappean formation; this is covered in some of the nooks or valleys with a pulverent mould or loam deposit several feet in depth. The plant grows luxuriantly in such soil, but apparently will not thrive in marshy soil, nor where there is present more than 10 to 20 per cent. of clay or 30 per cent. of sand. The government returns for the whole island give only about 250 acres of land devoted to ginger. This amount of acreage would not yield the crop harvested. But the real cultivation is not in acres, many cultivators having beds varying from 6 feet square up to the size of a building lot. A few cultivate from one to six acres. Large plots are very rare. For the most part, it is put in the ground in any convenient spot, alongside pineapples, yams, cocoa, cassava or other plants, often in the midst of a dense growth of bush or weeds.

In the statistics of this fertile island this article does not figure in pounds, shillings and pence as largely as do some of its other pro-

Sir Henry Arthur Blake, K. C. M. G., Governor of Jamaica.

ducts. Economically speaking, however, ginger is one of its most important articles of commerce. In my judgment, from 25,000 to 50,000 of its people are more or less dependent upon the ginger

crop for such ready money as is essential to maintain their existence. The cultivation and gathering of this drug is largely in the hands of that peculiar class of West Indian peasants known as Quashie. Quashie is the title given the snuff-colored and brown people as distinct from blacks, that make up nine-tenths of the inhabitants of the West Indies.

Though I know him well, it would be impossible to paint Quashie in words. To appreciate him, one must be in his actual presence. From a Northern standpoint he is poorly equipped for the battle of life; he is simple-hearted, unambitious, and intellectually poor. Life to him is not serious, nor very earnest. It is more like a sunny dream. He lives in a hut far back from the road, a home bowered in tangled foliage brilliant with flowers. It is one-storied, one-roomed, unfloored, thatched with palms, opening all around, plenty of ventilation, but it is orderly, clean and tidy. He has a buxom mate, numerous daughters, but few sons. Like him, they are all symmetrically cast, clean, and full of tropical vitality. Food is more than abundant; it drops from the trees and springs up from the ground. Ever so few shillings pay the taxes, and supply clothing and all other wants, whether of necessity or luxury. He owes no man, and no man owns him. Thus, in humble surroundings, the typical ginger planter lives in more independence, ease and contentment than any dispenser of Jamaica ginger may even hope to attain.

The ginger planter is not given to taking in knowledge or giving out information. Long and vigorous cross-questioning will, in the end, only elicit the fact that he "doesn't rightly know" anything about ginger, or how much will be his own or his neighbor's crop. To the price or crop prospects, improvements in cultivation, difference in quality, he gives little thought or care. He divides ginger into "blue" and "yellow" from the color of the rhizome. These are also known as, respectively, "turmeric" and "flint." I was unable to see any botanical difference in the plant producing the two different colored root-stalks, and many intelligent planters were unable to distinguish the kinds without first examining the root. If anything, it seemed to me that the blue was a degenerate species. The root of the blue is hard and fibrous, yields a much

less proportion of powder, is less pungent, and therefore less valuable commercially.[1]

There is also a division into "plant" and "ratoon" ginger. Plant ginger is ginger that is planted each season; ratoon ginger is really a product of laziness. It is a return crop, secured by leaving a part of the "hand" containing a bud in the ground when the crop is harvested. Ratoon ginger is much smaller in size of hands than the planted, and loses each year in flavor, each successive crop being less and less in amount.

GINGER PLANTING.

Ginger is planted in March and April. The planting process consists in burying the divided fingers, each division containing an "eye" or embryo, in trenches or holes a few inches below the surface and about a foot apart, similar to the process of planting potatoes. The small grower simply digs a hole in a convenient spot. The thrifty planter first burns over his plot, to destroy weeds and insects, then ploughs and lays the plot out into beds and trenches.

The growing plant needs plenty of sun, and the weeds and bushes must be kept down. This latter is a perplexing problem, unless the weeds have been destroyed before the ginger has been planted. If the weeds are pulled or the ground disturbed while the plant is growing, water is apt to settle around the roots, and this rots them. The average Jamaica planter is not given to work, and he generally lets the weeds and ginger solve the question by fighting it out for themselves.

The reed-like ginger plant, with its leafy stems, grows sometimes to a height of 5 feet; its cone-topped flowering stems reach from 6 to 12 inches, and, in a well-cleaned field, make a pretty show when in their September bloom.

On wet soil and during very rainy seasons the root is subject to what is termed "black rotten." This is a rotting induced by warm, soggy soil. The root swells in spots, fills with water, turns black, and emits an offensive odor. In this condition it is attacked by insects and worms, which has given rise to the belief among the planters that the rotting is caused by a so-called ginger worm. (It is possibly a fungus disease.)

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[1] I found some shippers in Jamaica ports who were exporting the undried "blue" ginger to supply the demand for green ginger as used in pickling and preserving.

HOMES OF THE GINGER GROWERS.

Growing ginger must be well watered. Irrigation is practised to a limited extent, but in most of the parishes this is unnecessary, as the rainfall is abundant. Fertilization, though highly important, is rarely attempted, partly owing to the small profit, but largely owing to the customs of the country. The most that is ever done is to plough in the weeds and cover the ground with banana trash. Rarely will the planter ever gather up the manure from his live stock and throw it on the ginger-bed. There are no stables used in Jamaica, therefore no such thing as a compost heap. Sea weeds and watering the beds with sea water have been tried experimentally with good results; but no matter how large-sized roots or how fine a quality would be yielded, the average planter would not take the trouble to work his ground in a scientific manner.

An all-important feature is the rapid impoverishment of the soil that follows the ginger culture. One planter told me that only ferns would grow on the soil after exhaustion by this crop. There is thus a constant demand for virgin soil to secure the best-paying crops. This is attained by sending valuable timber up in smoke, as one authority tersely expressed it. "Dried-up streams, general barrenness, in fact a wilderness marks the progress of ginger culture."

The situation is clearly summed up by Mr. Wm. Fawcett, Director of Public Gardens for Jamaica, from whose report to the Honorable Colonial Secretary I quote:

"The soil which produces the very highest quality ginger, realizing, perhaps, £10 per cwt. in the London markets, is the very deep black soil of virgin forest. To grow ginger under this condition involves the destruction of large areas of forest. Magnificent trees, 6 feet in diameter, may be seen in some districts lying rotting on the ground, while the ginger cultivators have gone further to the centre of the island, abandoning the woodlands already cut down. The plan adopted in clearing a forest is for a cultivator to invite ten or twelve of his friends to a 'cutting match.' He provides food and drink, and the laborious work of felling trees is carried on merrily and without much expense. Afterwards, fire is put and the place is burnt over. This burning is considered very important, as much so as the virgin soil.

"Probably its importance is due principally to the deposit of potash and other mineral matters contained in the ashes, but the fire

will also sweeten the ground, correcting sourness; and, moreover, it destroys insect pests. Some cultivators will only grow ginger in freshly-cleared woodland, and next year they move on to a new clearing; but although in this way they get very fine ginger, it is at the expense of forest land which would require a heavy outlay and perhaps a term of 100 years to restore. Albert Town was not long ago a great centre for the cultivation, but I was told there that growers had already got as far as 14 miles further inland.

"Ginger can be, and is, grown in many places year after year on the same ground. An intelligent cultivator at Borbridge stated that he knew of ginger growing for forty years in the same patch. Sanford Town is a German colony, and one of the original colonists, Somers, an active old man of eighty years of age, has been cultivating ginger and arrowroot there since his youth. He and the other colonists have been in the habit of planting a small patch one year, leaving it to ratoon as long as it was profitable, then throwing it up or growing other plants until, after a term of years, they again plant the same patch with ginger. This is an irregular rotation of crops; 'plant ginger,' the product of planting, is of better quality than the ratoons, and the ratoons in each succeeding year are inferior. When the ground is too poor to grow 'white ginger,' the 'blue ginger,' the inferior variety, can be grown.

"More depends upon the curing of ginger, considering the crop as a livelihood, than soil. I believe that the badly-cured ginger brought sometimes to the market is due to wet weather, rather than to want of care.

"The export of ginger is, on the whole, on the increase, but if this is accompanied by the gradual destruction of woods and forests, it is not a subject of congratulation."

An examination of the exhausted soil revealed the fact that it was deficient in organic matter, lime, phosphoric acid and soda. Attempts made, at my suggestion, to supply these deficiencies by the use of market fertilizers of various kinds were not productive of any favorable results. Stable manure alone resulted in a failure, as likewise did the use of a bat guano found on the island. The use of a marl, especially when mixed with stable manure, was a partial success.

The Jamaica Agricultural Society, in 1895, began a series of practical experiments which are still in progress. Their first results,

gathered in February, 1897, were somewhat affected by a drought in the previous November. Upon a limited area of worn-out land, which in a check experiment gave no return, they secured a crop which would be equivalent to over 2,500 pounds of cured per acre, and the product was of extraordinary size and quality. The fertilizer aiding in bringing this result was a mixture of marl with a compound fertilizer made up of about 10 per cent. each of soluble phosphates, ammonia and potash salts. These results were very encouraging and the society have extended them by securing larger plots, giving aid to planters in the way of furnishing fertilizer, etc., returns from which will be gathered in the spring of 1898.

The solution of the problem of reclaiming land exhausted by the ginger and other crops, and the prevention of the further wasteful destruction of valuable soil, is in Ginger Land one of great moment. There is in this fair Island thousands upon thousands of acres of abandoned land, lying within easy reach of roads and ports; much of it has been abandoned because the soil has been exhausted by ginger or coffee. If by suitable tillage and manures it can be reclaimed, great benefits to the inhabitants will follow.

Ginger, as we know it, is the root-stalk of the plant. The root proper or root fibres are about ½ inch long, not very numerous, dying off as the rhizome advances and leaving a slight scar. As regularly-shaped hands, with more or less straight fingers, command the higher price in markets, experiments were made to secure a regular-shaped growth. Owing to the peculiarities of the native planter, instructions were not closely followed and the results were unsuccessful. The fact was developed that a sprout starts from the parent eye, and from this stem, in turn, lateral shoots or branches develop in pairs. These side branches again develop in pairs, these pairs generally alternating to opposite sides. It was found that if the soil was well worked and pulverized before planting, the growth was straighter than when planted in hard soil. Some difference was noted also in the condition of the parent plant; if this was well developed and vigorous, the resultant root-stalk was of a better type than where the parent was small, knarly and crooked. The Botanical Department is now experimenting with selected plants.

GATHERING THE GINGER CROP.

Ratoon ginger is gathered from March to December, but planted ginger is not ready for digging until December or January, and from then until March is the "ginger season."

Ginger is known to be ready for harvest when the stalk withers. This begins shortly after the bloom departs. The rhizomes are twisted out of the ground with a fork. In this operation, every bruise or injury to the hands is detrimental to the market value. There is quite a knack in doing this, and it takes long practice to become expert.

The hands are thrown in heaps, the fibrous roots are broken off, and the soil and adherent matter removed. This must be done quickly after removal from the earth, for, should the ginger be dried with the soil and roots still adhering, the product would not be white, and, if it lies in heaps before drying, it will mould. The custom is to throw it immediately into a dish of water; it is then ready for the uncoating or peeling operation; this is done by hand. A planter who has any quantity of it on hand, will make a "peeling match" by gathering his own numerous family, and whatever help his neighbors can afford. The ginger season thus becomes a time of merry-making.

It was my privilege and a part of my studies to be present at one of these peculiar harvest-home gatherings in Ginger Land. I was given a point of vantage overlooking the dancing hall, which on this occasion was the cement floor of the barebcue. The light of a few sickly lanterns, a smoky torch and the hot glare of the tropical moon gleamed on the dusky men and maiden ginger-peelers. Their dresses were marvels in color, the men in somber black, except for white vests and rainbow sashes. Against the dark-skinned forms of the gentler sex were brilliant reds, yellows, green and blues. Their skirts stood out balloon-like, stiff with cassava starch. Trinkets of silver and gold were heavy and plentiful. They danced to the music of squeaky accordions, clapping of hands, and the plaintive, wailing, but musical voices of the on-lookers. There was plenty of noise—plenty of ginger in that dance. The native "Spiritus saccharum jamaicaiensis" was dispensed freely, but I have seen much less orderly merry-makings in our own land of culture, and in all that excited, hot-blooded crowd not one was drunk or committed any flagrant breach of propriety. Past midnight I lay

down on the only bed that the hut of my host Quashie afforded; at intervals I awoke, to find that the ginger dance was still on. When the first rays of light came over blue mountain peak, there, on the bed, under the bed, sprawled in heaps, over the floor, were the exhausted dancers, fast asleep. But for all they had made such a night of it, before the sun's rays had entered the cabin they had bathed their bodies in the cool spring, taken a cup of coffee, and were fresh for the day's work.

PEELING GINGER.

Ginger-peeling is an art, and there are many expert peelers in Jamaica. The ginger knife is simply a narrow-edged blade riveted to a handle. In large operations an expert peels between the fingers of the hands, less experienced hands peeling the other portions. Examination of a transverse section of ginger will show the import ance of the operation. There is an outer striated skin under which there are numerous layers of very thin-walled cork cells. This layer contains numerous oil cells, the oil cells being most numerous at the bud points. The oil contained in these cells, in specimens fresh from the ground, is almost colorless, very pungent, and exceedingly aromatic. It becomes yellow very quickly on exposure to the air, and, even upon drying without removing the epidermis, its delicate aroma is found to be fleeting. On drying the ginger the contents of these cells appear as a yellow, pitchy mass. (It has been stated that this coloring matter is identical with that of Curcuma.) As this cork layer is the seat of the greatest amount of oil and resin cells, it will readily be seen that the deeper the peeling so much the more of these substances will be carried away with the epidermis, and more cells opened from which these principles may exude.[1]

As fast as peeled, the roots are thrown into water and washed. The purer the water and the more freely it is used, the whiter will be the product. Generally a very little water washes a great deal of ginger. The hands are peeled during the day, and allowed to remain in the water over night. This water acquires a slimy feeling and, if concentrated, becomes mucilaginous and acquires a warm and aromatic taste. The natives claim that this process soaks out the

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[1] The Jamaica agricultural society has advertised in the United States and England the desirability of a machine or apparatus to be used in removing the coating from ginger; experiments along the line are now being made.

"fire and poison" from very hot ginger. I placed some pieces in a stream of running water for twelve hours, and succeeded in making them several shades lighter in color. This sample proved to be less pungent to the taste, and it is quite possible the force of the water carried away some portion of the aromatic principles.

A few planters use lime juice in the wash water. This gives a whiter root, having some solvent action on the coloring matter, but, as the lime juice contains saccharine and pectose matter, it prevents drying, and mildew follows. In another experiment I supplied the natives with citric acid, vinegar and acetic acid. They all worked fairly well, citric acid being the best whitening agent, but it was reported that the process was expensive and troublesome.

It is generally stated that ginger is deprived of its coat by being

Barbecue used in Drying Ginger.

plunged into boiling water before being scraped. This practice is not used to any extent in Jamaica. Its effect is to swell the starch and bassorin-like gums. I found that after keeping the freshly-peeled root-stalks in boiling water for an hour they were considerably swollen and the steam was filled with the aroma of the ginger. Under this treatment the coating comes off easily; but, if the action of the boiling water is prolonged, the starch and fibre are acted upon, the product dries hard and the color is darkened. In fact, what is known as "black ginger" of the market is the result of this process. Ginger is found in the market coated with calcerous matter, such as carbonate of lime, etc., this is said to be to fill a demand for "white ginger." Such a proceeding is apparently unknown among the planters. Well-cured ginger has a decided white coating and that is all they know about it.

It has been stated that it is a common practice to bleach ginger with the fumes of chlorine or sulphurous acid. It may be done in the other parts of the world, but no instance of it is known in Jamaica.[1] There is scarcely a planter with intelligence enough to use, or who would take the pains to employ, such a process. I tried chlorine gas as a bleaching agent, but at best the product was of a dirty yellow color. By using the fumes of burning sulphur, the whole being partially enclosed in glass, the heat of the sun aiding in the experiment, the ginger was whitened and mildew prevented. I found on trial that it might be of service to place the ginger in a weak solution of chloride of lime before drying; this would aid in bleaching and prevent mould.

CURING GINGER.

After washing, the process of drying follows: The tropical sun is the drying agent in all cases. Large operators have what is called a "Barbecue." This is a piece of ground several feet square, leveled off and laid with stone and the whole coated with cement. It is placed so as to receive the greatest amount of sunshine. The small planter uses what is called a "Mat," consisting of sticks driven into the ground, sawbuck fashion, and across these sticks are laid boards, palm, banana or other large leaves; oftener than otherwise, the place for drying is a few palm leaves spread upon the ground.

Careful handlers put their ginger out as the sun rises, and turn it over at mid-day, taking it in at sundown. Rainy or cloudy weather invites mildew. It requires 6 to 8 days for the root to become thoroughly dry. I made several tests to ascertain the loss in weight by drying in the sun, and found the average to be nearly 70 per cent.

Ginger dried in the sun for the market examined for moisture gave the following results:

Six samples, well-dried specimens, showed a further loss when dried at 100° C. as follows: 7·2, 8·5, 8·9, 9·5, 10, 11, 12 per cent.

Several poorly-dried specimens, some of which were damp and mouldy, gave from 15 to 26 per cent. moisture when dried at 100° C. During the progress of my attention to this subject, several attempts were made to utilize artificial heat in drying ginger. Such a course would, in some respects, be a very desirable one.

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[1] Bleaching by chemicals and coating with powders are market processes unknown to the planters.

In a portion of the island given almost entirely to the cultivation of this product, a few years ago a wet season prevailed. It was impossible to dry the crop in the sun; as a consequence there was a loss of the crop, followed by considerable distress among the planters.

During my observations an attempt was first made to dry without removal of the skin coat. This, if successful, would have meant the saving of considerable labor. The product was quite dark, the flavor not as good as that of the sun-dried. By removing a part of the coat the drying was hastened. Dr. A. G. McCatty, a practicing physician and owner of a plantation, at my suggestion, placed in operation an American fruit evaporator. It was necessary to use wood as a source of heat, and, partly owing to the high temperature and partly from the ignorance of the operator, the product so

"Mat" for Drying Ginger.

far has been rather poor in quality, the color many shades darker, much of the aroma was lost, and a smoky, burned flavor acquired. Other planters are trying the process on this year's crop.

A curious incident resulted during these experiments. The natives, through prejudice against innovations, boycotted the drying apparatus, and refused to furnish supplies at any price. Experiments were made with calcium chloride as a drying agent. The result did not equal samples produced by the native method of drying in the sun. Attempts made to dry the ginger after first slicing, as might be expected, resulted in great loss of flavor and pungency. My conclusions were that, when well conducted, the native method of careful peeling and curing in the sun would produce a handsomer and a better product than any process yet suggested.

These observations were not undertaken with a view of making

any complete analysis, and it was found that a macroscopic examination by expert judges was far more reliable than any assay that could be made with limited facilities present in the ginger fields. A few such examinations were made as follows:

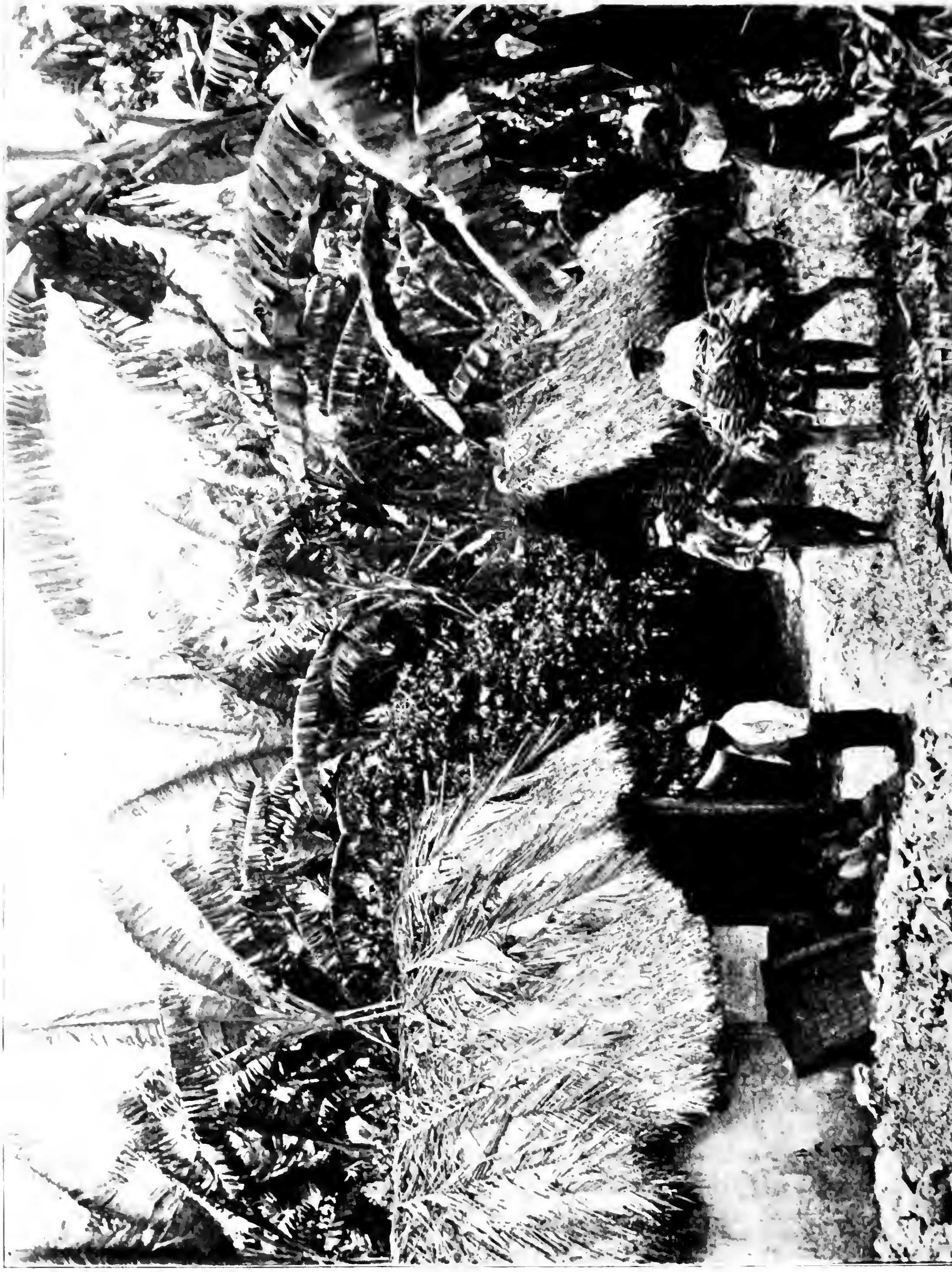
Ethereal Extract.—Exhaustion of the ginger with ether in a Soxhlet extraction apparatus. The resultant extract, after evaporation of the ether, was dried over sulphuric acid to remove moisture. From this extract the volatile oil was calculated by the loss on drying the ethereal extract at 110° C. for three hours. The only results from this process that seemed to be of value were that the finer grades, when carefully dried, contained a higher percentage of volatile oil.

Ginger dried without removing the peel gave somewhat higher results as to volatile oils than the peeled. The loss of this constituent was greater in a product dried by artificial heat than when dried by sun. The amount of volatile oil found by aforesaid process was, lowest, 1 per cent.; highest, 3·20 per cent. The results as to ethereal extract, exclusive of volatile oil or from alcoholic extract from the ether-exhausted residue, seemed to be of little value, the different specimens giving such greatly changing amounts as to afford no guide.

In these experiments some observations were made that were interesting, though of no particular value. In the extracts from ratoon ginger there was evidently a more fiery taste and less flavor than in the planted ginger. This was also true in regard to the extracts from the blue and yellow varieties, the yellow having a much finer odor and taste. Upon the addition of water to these extracts in sufficient amounts to precipitate the dissolved resins, it was observed that in the case of the well-cured specimens of plant ginger a delightful aroma was imparted to the water, a true ginger flavor, without fire or pungency. But in extracts from old ratoon ginger, from mildewed specimens spoiled in drying, this aroma was greatly changed, becoming musty and weak, the taste in some instances being decidedly bitter. Ninety-five per cent. alcohol was found to give better results as to flavor of extract than that of lower strength.

MOVING TO GINGER MARKET.

When the native tropical sun has fully dried the ginger crop, it is stored in heaps for market day. By unchangeable Ginger Land



customs, there are certain days and times to carry products to market. There are banana days, pineapple days, pimento days and ginger days. The buyer must take in his supplies on these days or go without them.

The ginger crop is carried from five to forty miles to a place of sale. In the proper season, along the white-paved roads, from the cool, refreshing hours of the morning far into the night, ginger may be seen moving to market. The richer planter, with a lace bark rope, leads a heavily-laden donkey with panniers heaped. Sometimes piled high on either side, above the ginger are pineapples, plantains, yams, and strange-looking fruits; over all are bunches of knotted sugar cane and nets filled with green cocoanuts. But by far the greater portion of the ginger, and every other crop, is moved by head-loads.

Troops of Jamaica's brown and yellow daughters are seen trudging up and down hills under the terrible sun, with a load of a hundred pounds or more at graceful equipoise on their gaily-turbaned heads. All have their garments kilted up to their bare dark knees. These women have taken their colors from the fruits: their complexions are orange, olive, sapota, mango, deepening into a bronze-black. They are upright as darts, walk with a free, unhindered stride, without any swinging of the shoulders, impressing one greatly with their grace and elegance of motion. Carrying their heads like queens, without nod or turning, they cry out in a high-pitched musical key, to the bystanders, "Marningbuckra," and pass on, their naked feet making a great whispering sound over the smooth roadway. In a picturesque way ginger passes to the market town.

The market may be in the port town or at the crossroads store. The sign at this latter place reads, in rather shaky characters, "Lisened to dele in Agricultural Produse," which is made to include rum, gin, and a general conglomeration of merchandise, not counting drugs and medicines. In this sort of a place anything in the shape of hands and fingers is ginger, and is dumped into a barrel without any sorting, to be shipped to the port. Often the small shopkeeper is heavily in debt to the large trader in the port, and, when ginger is wanted, makes haste to get in as much as possible, regardless of quality.

IN THE GINGER MARKET.

The markets of these West India towns are the important centres of commerce. Here, in a large open space near the quay, a great hurry and clatter of brisk business proceeds under the beautiful blue sky and blazing sunshine.

Quashie requires much conversation to complete a bargain. One would suspect by the bustle and noise that the entire wealth of the Island was changing hands every few minutes, but the truth is, the most prolonged and loud wrangle closes a transaction involving a minute fraction of a penny. There are a few benches or stalls under the market arcade, but they require a rental fee; so, for many, an upturned barrel outside constitutes a stall. Those who have no barrel pile their wares on the ground between their sprawling black limbs. It is a good place to study fruits and vegetables monstrous in size, with outlandish names, but luscious in looks. Many kinds of drugs are here in their primitive state, ginger in abundance. Nearly every other seller cries out: "Buckrayouwangingafoobuy" (white master, do you want to buy ginger?)

These black people speak with a rolling current of vowels and consonants, pouring them out so rapidly that none but an acclimated ear can detach an intelligible word. The ginger is not weighed, measured or counted, the standard is a "heap." A heap of ginger is a pile that enlarges or diminishes according to the law of supply and demand. If the hands are finely shaped and large, there are fewer in the heap; if they are small, dark and snarly, the heap is made larger. If the price of ginger goes up in London or New York, it is because the heaps in this market have been made smaller. If the price goes down, these heaps have become larger and finer. The price of ginger in the drug exchanges of the world is the reflection of the changing size of these petty heaps in Ginger Land.

The ruling price in Kingston and Montego Bay for the heap is a penny-ha'penny (about three cents). Heaps purchased by me varied according to quality, but the average weight was from one-fourth to one-half pound.

The buyers of ginger for shipping are expert and accurate. They grade, sort and price with a quick eye and ready touch gained by years of practice. The highest grades are large-sized hands of light and uniform color, free from evidence of mildew. This grade is brittle and cracks easily, but broken pieces depreciate the value.

Buyers also require the hands and fingers to be firm and full, without wrinkles or spots. They generally assort into four or five grades, that which is shriveled and small being the lowest. The dark varieties form another, the heavy, tough and flinty a third. These four are finally assorted by placing hands which are small but of good texture and color as one grade. The larger-sized, well-bleached hands into the highest grade.

The ratoon finger sorts generally bring the lowest price, as they are small, soft and soggy, and lack flavor. Ginger gathered green shrivels much in drying, and is less aromatic and pungent than when fully matured. Ginger that has mildewed is spotted, and the mildew starts a decomposition that affects the flavor. Ginger put in bags or laid away before being thoroughly dried will mould and acquire a musty odor and flavor, which it is impossible to remove.

The largest-sized hands are carefully selected by buyers and shipped to special markets, usually to England. I noticed hands weighing as much as eight ounces; many of them weighing from four ounces upward.

Ginger is packed in barrels for shipment.

ECONOMICS.

The amount of ginger exported from this Island during the last ten years is shown in the following table[1]:

	Pounds.
1887	1,121,827
1888	1,141,877
1889	1,002,653
1890 (½ year)	554,193
1891	1,219,197
1892	1,822,531
1893	1,526,884
1894	1,672,384
1895	1,736,460
1896	1,960,609

[1] Figures obtained from the office of the collectors-general of Jamaica show that more than one-half of the crop is shipped direct to the United States ports.

The amount of ginger imported into the United States from all parts of the world, from the years 1890 to 1894, was as follows:

	Pounds.
1890	2,328,825
1891	2,697,989
1892	1,431,295
1893	2,927,942

The yield and profit of the ginger crop depend somewhat upon the nature of the soil. In favorable seasons rainfall, sunshine, planting, care and curing, are also factors. An average yield can be estimated at from 1,000 to 1,500 pounds dried ginger per acre. In exceptional cases, 2,000 pounds have been gathered. There are planters in Jamaica who plant ginger here and there in patches, and gathering as little as a hundred pounds in a year. Ginger is well adapted to the small planter, and admirably suited to the peasantry of Jamaica, who, by slow evolution, are passing from serfdom to manhood and independence.

The exact cost of producing this crop is difficult to calculate. The present output is largely the product of domestic labor, whose value is hard to compute; when this class of labor is hired, it becomes very costly. The figures in the following table are approxmate only; as now conducted there is chargeable against the crop the item of rent, or tax, (if the cultivator is an owner) the labor is mainly that of the family.

An approximate estimate of the expenditures and receipts on an acre of land planted in ginger are as follows:

Ground-rent or tax	$5.00
Clearing land, ploughing and planting	40.00
Cost of plants	50.00
Digging and preparing	15.00
Peeling	45.00
Drying	25.00
Delivery at market	10.00
	$190.00
Fertilizer (if used)	50.00
Superintendence	20.00
	$260.00

Yield: 1,500 to 2,500 pounds (cured ginger), at 12 cents per pound, $180 to $300.

Viewed from this standpoint, the cultivation of ginger on a large scale would be far from remunerative. In this connection we may note that a Royal commission, appointed to investigate the depressed condition of the industries in the West India Islands, have recently submitted a report to Her Majesty's Government. Among the recommendations made was "The settlement of the laboring population on small plots of land as peasant proprietors." This corroborates our view that, from the Jamaica standpoint, it is better economy to leave the cultivation of ginger remain where it is. The introduction

of artificial heat for drying, machinery for peeling, will have a tendency to deprive the peasantry of a source of income, and this, so far as these investigations show, will not improve the quality of the product.

The Botanical Department, through its corps of agricultural instructors, is now going among the people and showing them exactly what may be done in the way of improving their methods of cultivation. The Jamaica Agricultural Society is conducting practical and extensive demonstrations to show the use and value of fertilizers. These have already an important bearing upon this crop. Information recently to hand states that the crop which will be gathered in the coming season (Spring, 1898) will probably be the largest ever grown upon the Island. This is due to the improvements in cultivation, together with an abundant rainfall. Unfortunately for the ginger planter, a largely-increased production will tend to lower prices.

I am aware of the fact that these notes will add but little to the already recorded observations upon ginger. It may be questioned whether such a common article of materia medica merits any extended research. We should, however, realize that any drug that holds a name and place in medicine is of sufficient importance to merit our best efforts.

Our knowledge of the changes which take place in crude drugs, due to the methods of preparation, is very meagre. Karl Dieterich (*Berichte der Deutschen Pharm. Gesellschaft, 1896, p. 335*) says:

"Thus it is that I am convinced that the study and development of this branch of pharmacy will yield far more than theoretical results and that the analysis of fresh and dried drugs at different stages will be of great practical advantage in directing the proper manipulations to be employed in producing uniform and superior products." My convictions are strong that the study of drugs should begin in their habitat and extend to the bedside of the patient. That it is important to know every change that may take place in their cultivation and collection as well as those incident to their preparation for administration, this seems to be sufficient warrant for these observations taken in the Land of Ginger—Jamaica.[1]

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[1]In preparing this paper, valuable assistance has been rendered the writer by those whose names are mentioned therein. In addition, he feels indebted to His Excellency, Henry A. Blake, Governor of Jamaica ; to the Hon. Q. O. Eckford, ex-United States Consul ; to George A. Douet, Esq., Secretary of the Jamaica Agricultural Society ; to L. Frazer, of Montego Bay, and many others.

TESTING OF FORMALDEHYDE.

By Carl E. Smith.

Report of Research Committee DII., Committee of Revision of the United States Pharmacopœia.

The rapidly increasing uses of formaldehyde make it desirable that standards be established for the strength and purity of the commercial products. A method of assay, simple and rapid, as well as reasonably accurate, is needed as a guide for manufacturer and pharmacist, as also tests for the various impurities liable to be present, and reactions to establish its identity. As the commercial solutions vary considerably in quality, ready means should be at hand for controlling the quality of the pharmacist's supply.

ASSAY METHODS.

A method of assay, to be generally applicable, must not be affected in accuracy by the presence of ordinary impurities frequently contained in commercial formaldehyde solution, such as methyl alcohol and acetone; neither should it require much time and attention or complicated operations. Of the number of methods which have been published within recent years, the principal ones were examined, in order to ascertain which of them approaches nearest to these requirements, with the results stated below:

Hydroxylamine Method.—Proposed by Brochet and Cambier (*Compt. Rend.*, vol. 120, p. 449, and *Ztsch. f. Anal. Chem.*, vol. 34, p. 623). Based on the reaction of hydroxylamine hydrochloride and formaldehyde, with the liberation of hydrochloric acid, according to the following equation:

$$NH_2OH.HCl + H.COH = CH_2N(OH) + HCl + H_2O.$$

The formaldehyde entered into combination is determined by the amount of acid set free.

In the experiments made the details prescribed by the authors were followed, except that $\frac{n}{10}$ soda solution was used for titrating the hydrochloric acid instead of $\frac{n}{10}$ borax solution.

10 c.c. of a solution containing 0·0864 gramme of a concentrated formaldehyde solution were mixed in a small flask with 10 c.c. of a 2·5 per cent. solution of hydroxylamine hydrochloride. (The hydroxylamine salt is about 5 times the amount involved in the

reaction. This large excess was afterward found unnecessary, 50 per cent. excess being quite sufficient.) After standing 10 minutes the liberated acid was titrated, requiring, after deducting 0·1 c.c. for free acid in the hydroxylamine solution, 10·7 c.c. of $\frac{n}{10}$ soda; 1 c.c. = 0·003 gramme formaldehyde.

$$\frac{10{\cdot}7 \times 0{\cdot}003 \times 100}{0{\cdot}0864} = 37{\cdot}2 \text{ per cent.}$$

Several trials were made to determine the time limit of the reaction.

Allowing 20 minutes to complete the reaction, the result was 37·2 per cent.

Allowing 45 minutes to complete the reaction, the result was 37·3 per cent.

Other trials showed that shaking the mixture does not materially hasten the reaction, and that it is practically complete in 7 to 8 minutes after admixture.

The above figures agree closely with those obtained on the same solution by other methods.

The method is quick and accurate, when applied to pure solutions, but the accuracy is interfered with by the presence of other aldehydes and acetone, as stated by G. Romijn (*Ztsch. f. Anal. Chem.*, vol. 36, p. 18). For acetone the statement was verified by a simple test-tube experiment; aldehydes were not tried.

Iodine Method.—Proposed by Romijn (*ibid.*). Nearly identical with Messenger's process for estimating acetone, and therefore unsuitable for the assay of solutions liable to contain *acetone*. It was used only to determine the strength of pure solutions, made from para-formaldehyde, and for this purpose was found accurate and convenient. A very dilute solution of the formaldehyde is mixed with an excess of $\frac{n}{10}$ iodine solution, and caustic alkali solution added until the iodine is decolorized. After standing 10 minutes, dilute acid is added to liberate the excess of iodine, and this estimated with sodium hyposulphite.

Cyanide Method.—Also devised by Romijn (*ibid.*). It is based upon the formation of an addition product of formaldehyde and potassium cyanide, from which the cyanide cannot be precipitated

with silver nitrate. It involves the use of standard solutions of silver nitrate, potassium cyanide, and potassium sulphocyanate. This method requires much more care and attention than any of the others tried, and a few trials showed conclusively that it is not likely to give satisfactory results except in practiced hands. It was, therefore, considered useless to proceed further with it.

Fixed-Alkali Method.—This consists in heating the formaldehyde with sodium or potassium hydrate solution under pressure, in a manner similar to that in the saponification of esters. The formaldehyde is converted into methyl alcohol and formic acid as follows:

$$2\,CH_2O + KOH = CH_3OH + KCHO_2.$$

The method was most satisfactory when conducted as follows: 3 grammes of the sample are placed into a strong bottle of 50 c.c. capacity, with 25 c.c. of $\frac{n}{1}$ soda solution, the bottle closed with a tight-fitting rubber stopper, this tied down with a cord, and the bottle, after wrapping with a cloth, immersed in boiling water for one-half hour. After cooling, the excess of soda is titrated with $\frac{n}{1}$ sulphuric acid and phenolphthalein, each c.c. of soda solution consumed indicating 0·06 grammes, or, if 3 grammes be taken, 0·5 per cent. of formaldehyde.

The time required to complete the reaction is very much less than is stated by others who have tried the method, nor were some other stated disadvantages noticed, such as thickening or resinifying of the solutions. The results were reasonably accurate, except in the case of one commercial sample. The following figures illustrate the duration and degree of heat necessary. They were all obtained with the same formaldehyde solution:

Heated *in* boiling water.	Per cent.	Heated *over* boiling water.	Per cent.
15 minutes	37·1	15 minutes	32·5
30 "	37·3	30 "	34·5
1 hour	37·6	1 hour	37·1
2 hours	37·2	2 hours	37·7
		3 "	37·3

On *prolonged* heating the solution frequently darkens, so as to make dilution necessary before titrating.

The influence of the presence of acetone and methyl alcohol on the accuracy of the methods was determined.

Acetone.—3 grammes of formaldehyde solution, 25 c.c. of $\frac{n}{1}$ soda solution, and 0·5 c.c. of pure acetone were heated under pressure in boiling water for 45 minutes. A duplicate assay, omitting the acetone, was made under the same conditions. In the mixture containing the acetone a white, flocculent precipitate formed on heating, and titration with sulphuric acid indicated that not more than one-third of the theoretical amount of soda had been used up. The duplicate containing no acetone gave normal figures. No attempt has yet been made to ascertain the composition of the precipitate and the cause of its formation.

Methyl Alcohol—To 20 c.c. of a dilute aqueous solution of pure formaldehyde, 1 c.c. of commercial methyl alcohol was added and the mixture heated with soda solution, as described in the acetone experiment. The solution was assayed under the same conditions without addition of methyl alcohol:

	Per cent.
Without methyl alcohol	4·65, 4·65, 4·71
With " "	4·38, 4·35

Repeated with pure methyl alcohol, 0·5 c.c. of this was added to 2·25 grammes of a concentrated solution of pure formaldehyde:

	Per cent.
Without methyl alcohol	37·3, 37·3
With " "	35·5, 35·7

No explanation can be made at present for the lowering of the result by the presence of methyl alcohol.

The chief disadvantages of the fixed-alkali method are interference by acetone and methyl alcohol and risk of explosion when heating under pressure. It is also subject to some variation in the results—noticed with one sample only—the causes of which cannot be satisfactorily explained at present.

Ammonia Method.—First proposed by Legler (*Berichte*, vol. XVI., p. 1333) and based on the reaction of free ammonia and formaldehyde to form hexamethylene-tetramine:

$$6\ CH_2O + 4\ NH_3 = N_4\ (CH_2)_6 + 6\ H_2O.$$

A normal ammonia solution is usually recommended, while the decinormal is preferred by others. As the use of the latter necessitates weighing or measuring very minute quantities of formaldehyde, or else diluting a larger quantity and taking an aliquot part

for assay, the work was restricted to the use of the stronger solution. Only one trial with a decinormal solution was made, which indicated that the assay would require about one hour, and that rosolic acid is not sufficiently sensitive in presence of hexamethylene-tetramine to give serviceable results until after some practice.

Experiments with $\frac{n}{1}$ ammonia solution: 25 c.c. of the ammonia solution were run from a burette into a flask and 2·25 grammes of sample added. The flask was then closed with a glass stopper thickly coated with vaseline. The mixtures were allowed to stand a definite time, and then the excess of ammonia titrated with $\frac{n}{1}$ sulphuric acid, using rosolic acid as indicator. Each c.c. of $\frac{n}{1}$ ammonia corresponds to 0·045 gramme, or 0·5 per cent., when 2·25 grammes are taken.

	Per cent.
Titrated at once after admixture	36·0
" after 15 minutes	37·4
" " 1 hour	37·5
" " 2 hours	37·5
" " standing over night	37·4

Other trials, previously made in flasks closed with rather loosely-fitting rubber stoppers, gave somewhat variable figures, the tendency being too high results through loss of ammonia, particularly when considerable time elapsed before titrating.

Assay in Presence of Acetone.—A mixture of 2·25 grammes of formaldehyde solution, 25 c.c. of $\frac{n}{1}$ ammonia, and 0·5 c.c. of pure acetone was allowed to stand 20 minutes and then titrated. The solution was assayed in a similar manner without addition of acetone.

	Per Cent.
Without acetone	34·9, 34·7
With "	34·8, 35·0

Assay in Presence of Methyl Alcohol.—A mixture of 2·25 grammes of formaldehyde solution (not the solution used in the preceding experiments), 0·5 c.c of methyl alcohol, pure or commercial, and 25 c.c. of $\frac{n}{1}$ ammonia, was treated in the same manner as above, and the formaldehyde solution also assayed without addition.

	Per Cent.
Without methyl alcohol	37·4, 37·4
With pure " "	37·5, 37·6
" commercial methyl alcohol	36·8, 36·9

According to these figures, commercial methyl alcohol may lower the result slightly, while pure methyl alcohol and acetone exert, practically, no influence. This method, then, is the only thoroughly reliable one of all those tried, the only drawbacks being a slight inaccuracy introduced through loss of ammonia by volatilization, and the necessity of frequently restandardizing the ammonia solution, which loses strength rapidly. These considerations suggested to the writer a modification of this method, which obviates the need of keeping on hand a standard solution of ammonia, and reduces the volatilization of ammonia, during the manipulation, to a minimum.

Ammonia Method Modified.—Dissolve 2 grammes of pure, neutral ammonium chloride in 25 c.c. of water and introduce it into a flask provided with a well-fitting stopper. Add 2·25 grammes of the sample, and then run in from a burette 25 c.c. of $\frac{n}{1}$ potassium (or sodium) hydrate. Stopper the flask at once and put it aside for one-half hour. Then add a few drops of rosolic acid solution and determine the excess of ammonia with $\frac{n}{1}$ sulphuric acid, each c.c. of $\frac{n}{1}$ potassium hydrate consumed indicating 0·5 per cent of formaldehyde.

The results obtained by this modification agree closely with those obtained by the hydroxylamine, fixed-alkali, and ammonia methods. The reactions involved are as follows:

$$NH_4Cl + KOH = NH_4OH + KCl;\ 4NH_4OH + 6CH_2O = N_4(CH_2)_6 + 10H_2O,$$

or,

$$4NH_4Cl + 4KOH + 6CH_2O = N_4(CH_2)_6 + 4KCl + 10H_2O.$$

The ammonia combines with the formaldehyde nearly as fast as it is liberated, and, consequently, has no chance to volatilize, and the final excess is so small that the odor is barely perceptible.

EXAMINATION OF COMMERCIAL SAMPLES.

Sample I.—Colorless, contains a white, flocculent precipitate probably para-formaldehyde, which increases on keeping, more

rapidly when exposed to diffused sunlight than in the dark. Specific gravity, 1·109 at $\frac{15^\circ}{15^\circ}$; free acid, assumed to be formic acid, 0·17 per cent. Residue on ignition, 0·19 per cent., consisting of sodium chloride and a little sodium carbonate.

	Per Cent.
Strength, by ammonia method	37·4, 37·5
" " fixed-alkali "	37·3, 37·6
" " hydroxylamine method	37·2, 37·3

Sample II.—Color faintly yellowish; contains fine particles of extraneous matter, but is free from a deposit of para-formaldehyde. Specific gravity, 1·052 at $\frac{15^\circ}{15^\circ}$; free acid, 0·065 per cent.; traces of acetone; residue on ignition, 0·015 per cent., consisting of copper oxide.

	Per Cent.
Strength, by ammonia method	34·6, 34·7
" " fixed alkali "	35·3, 34·7, 35·6, 34·0
" " hydroxylamine method	34·4, 34·6

Cause of discrepant results by the fixed-alkali method unknown. This solution is claimed to be 40 per cent. strong on the label.

Sample III.—Clear, faintly yellowish; specific gravity, 1·057 at $\frac{15^\circ}{15^\circ}$; free acid, 0·07 per cent.; traces of acetone; residue on ignition, 0·032 per cent., consisting of copper oxide.

	Per Cent.
Strength, by ammonia method (modified)	35·3, 35·2
" " fixed alkali "	35·3, 35·2
" " hydroxylamine method	35·0, 35·1

Samples II and III are apparently made directly from woodspirit, as judged by the presence of acetone, copper, and by the disproportionately lower specific gravity, indicating presence of a lighter liquid, probably methyl alcohol. These samples also have more empyreuma than is the case with Sample I; they leave a smaller residue of para-formaldehyde when evaporated spontaneously and deposit no para-formaldehyde when exposed to daylight for nearly a month.

TESTS OF IDENTITY AND PURITY.

The following list of tests is presented as a convenience to those who may wish to avail themselves of it as a guide in the examination of commercial products. The details of the tests are arranged

in such a manner as experiments seemed to show most practical. No test for methyl alcohol is included, as it was not found practicable to test for it in presence of formaldehyde except by tedious distillation. The pungent odor of formaldehyde completely masks the wintergreen odor obtained by the salicylic acid test, even when a large quantity of methyl alcohol is known to be present.

The solution should contain 35 to 40 per cent. of absolute formaldehyde, as ascertained by the ammonia method or its modification.

It should be transparent and colorless, have a pungent odor and caustic taste, and a neutral or faintly acid reaction. Specific gravity about 1·08 at 15°C. Miscible in all proportions with water and with alcohol. On mixing with an ammoniacal solution of silver nitrate, metallic silver is separated. Heated with alkaline copper tartrate solution, cuprous oxide is separated.

If to 2 c.c. of the solution an equal volume of potassa solution and about 0·5 gramme of resorcinol be added and the mixture heated to boiling, the yellow color which first appears gradually becomes red. (This reaction is said to be given by no other substance.)

If 5 c.c. of sulphuric acid (specific gravity 1·84) be placed in a test-tube with a little salicylic acid and 2 drops of formaldehyde solution added, a permanent deep red color will appear immediately.

If 1 c.c. of the solution be evaporated to dryness on a water-bath after addition of 5 c.c. of ammonia water, a white crystalline residue will remain, which, upon moistening with dilute sulphuric acid and warming, will evolve the pungent odor of the original solution. (Reconversion of hexamethylene-tetramine into formaldehyde and ammonia.)

If 5 c.c. be evaporated to dryness on a water-bath, a white amorphous mass is left, which should leave no residue on ignition (absence of mineral impurities).

Ten c.c. should require not more than 0·25 c.c. of $\frac{n}{1}$ potassium hydrate for neutralization, using phenolphthalein as indicator (absence of more than 0·1 per cent. of formic acid).

A coil of clean platinum wire, dipped into the solution and held into a non-luminous flame, should not color the flame yellow (absence of sodium), nor should it appear violet when viewed through a blue glass (absence of potassium).

Dilute the solution with three times its volume of water for the

succeeding tests. No turbidity or precipitate should be caused by silver nitrate (absence of chloride); nor by barium chloride (sulphate), nor by hydrogen sulphide or potassium ferrocyanide (metals), nor by ammonium oxalate (calcium).

If 1 c.c. of formaldehyde solution be mixed with 10 c.c. of iodine test solution, and potassa solution added until the solution becomes colorless, no precipitate should be formed, nor an odor of iodoform developed (absence of acetone).

The solution should be kept in dark amber-colored bottles, in a cool place, protected from light.

The writer is much indebted to Prof. Virgil Coblentz, in whose laboratory this work was carried on, for his great interest in these investigations, and many valuable suggestions in connection with them.

New York College of Pharmacy, January, 1898.

THE CHEMICAL ANALYSIS OF THE GASTRIC CONTENTS.[1]

I. Method of Analysis for Use in Clinical Work.

II. Record of the Analyses of the Gastric Contents of Fifty Healthy Individuals.

By Henry F. Hewes, M.D.,

Assistant in Chemistry, Harvard Medical School, Boston.

(*Continued from page 44.*)

Lactic acid is not a constituent of gastric juice, and is not produced in the stomach during the course of the normal gastric digestion.[59, 60] Statements contrary to this are found in many of the leading text-books; but the truth of the above statement has been adequately demonstrated by the researches of Bidder and Schmidt, Rothschild, Martius and Luttke, Boas and others.[59]

The presence of this acid, therefore, in the gastric contents, except in the amount ingested in the food as acid or salts, is of pathological significance.[60]

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[1] From *Boston Medical and Surgical Journal*, December 2, 1897.

[59] Martius u. Luttke: Magensaure d. Menschen, have proved this conclusively by establishing a comparison of the total acidity and total hydrochloric acid, and finding that they coincide or run parallel throughout digestion.

[60] Boas: *München med. Woch.*, No. 43, 1893; *Zeit. klin. Med.*, 1894.

The best test for lactic acid for practical work is the ferric-chloride test. A colorless solution of neutral ferric chloride is turned a lemon-yellow (gelbgrun) color by lactic acid. A more striking application of the test is seen in the Uffleman lactic acid test.[62] Uffleman's solution consists of 10 c.c. of 4 per cent. carbolic acid, 20 c.c. of water and one drop of 10 per cent. neutral ferric chloride. The pale amethyst color of this solution is bleached and replaced by a lemon-yellow color by the addition of lactic acid.

This ferric-chloride test responds to the presence of ½ gramme per mille lactic acid. As the amount of lactic acid contained in the Ewald test breakfast is at most $\frac{1}{10}$ gramme per mille, this test can be used as an index of the presence of produced lactic acid after the ingestion of this meal.[61, 63]

In testing for lactic acid in the gastric contents this ferric-chloride test must be used in a modified form, since the straight test or Uffleman modification are interfered with by certain substances which may be present in the normal or pathological contents.[61, 64]

Thus glucose, alcohol, peptones, carbonates, bile, butyric acid, potassic sulpho-cyanide, all substances which may be present in the gastric contents, may, to a greater or less degree, simulate the test.[61] Phosphates, hydrochloric acid and fatty acids, if in sufficient amount,[61] inhibit the test. These substances must, therefore, be excluded before making the test for lactic acid in the contents. A most satisfactory method of excluding these substances and testing for lactic acid in the gastric contents is the De Jong method.[65]

To 5 c.c. of the gastric contents add two drops of strong hydrochloric acid; heat the mixture to a syrupy consistency over a flame or water-bath; shake the residue with 10 c.c. of ether; separate the ether; to this ethereal extract add 5 c.c. of water and one drop of 5 per cent. neutral ferric chloride. If lactic acid be present in amount over ½ gramme per mille, a lemon-yellow color will be obtained.[66]

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[61] De Jong: *Archiv. f. Verdauungskrankheiten*, Bd. II, H. 1; also Langguth, same Archives, Bd. I, s, 365.

[62] Uffleman: *Deutsches Archiv. f. klin. Med.*, Bd. XXVI, s. 431.

[63] Lactic acid may be produced in the normal stomach by the action of free HCl upon the lactates of the food, but it is not built up there.

[64] Boas: *Deutsch. med. Woch.*, No. 39, 1893; *Berl. klin. Woch.*, No. 9, 1895.

[65] De Jong: *Archiv. f. Verdauungskrankheiten*, Bd. II, H. 1, s. 59.

[66] This is the best method for clinical work yet given. The other reliable

In this process butyric acid, potassic sulpho-cyanide, fatty acids and alcohol, if present, are separated by the addition of free hydrochloric acid and subsequent evaporation. These substances would otherwise be taken up by the ether. The lactic acid is taken up by the ether, while the remaining substances, as glucose, peptones, etc., remain in the residual contents.[67] This test includes both free lactic acid and lactates. It will not react to the amount of lactic acid contained in an Ewald test breakfast.[68]

If it is desired to detect the production of very small quantities of lactic acid (2 grammes per mille) the method of Boas must be used. For this test a meal containing no lactic acid is ingested. Boas' meal consists of an oatmeal soup, prepared by boiling 1 drachm of oatmeal in 1 litre of water. One or more hours after ingestion the contents are expressed, and subjected to a very delicate test for lactic acid devised by Boas.[67]

According to our present ideas, the production of lactic acid during gastric digestion occurs as the result of the fermentation of the carbohydrate foods, through the agency of certain bacterial organisms. Whether the fermentation is due to one definite organism or to several different forms of bacteria is not definitely settled. Huffe first demonstrated by scientific methods a specific bacillus as a cause of lactic acid fermentation. This bacillus (acidi lactici) is a short, plump, rod-shaped organism 1 to 1·7 μ in length by 0·3 to 0·40 in thickness.[69]

Miller has found several kinds of lactic-acid-forming bacteria in the mouth in normal conditions—among others, one similar to this bacillus of Huffe in morphological and physiological characteristics.[70] Kauffman and Schlesinger, Rosenheim and others have found that the presence of large numbers of a large bacillus of a type found in the mouth is characteristic of the gastric contents where lactic acid is produced.[71,72] The action of this bacillus is inhibited by an acidity

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methods given are that of Strauss (*Berl. klin. Woch.*, No. 37, 1895), and that of Boas (referred to later). Neither is as simple as the above. The ordinarily used Uffleman-Penzolt test is not free from error.

67 Boas: *Deutsch. med. Woch.*, No. 39, 1893.

68 De Jong: *Archiv. f. Verdauungskrankheiten*, Bd. II, H. 1; also Langguth, same Archives, Bd. I, s. 365.

69 Huffe: Mittheil a. d. Reichsgesundheitsamts, Bd. II, s. 307.

70 Miller: Die Mikro-organismen der Mundhöhle, Leipzig, 1889.

71 Kaufman: Bacteriologie der Magengahrungen, *Berl. klin. Woch.*, No. 6, 1895.

72 Rosenheim: *Loc. cit.*; also *Virchow's Archiv*, Bd. III, s. 414.

of $\frac{7}{10}$ per mille free hydrochloric acid, or 1 to 2 per mille combined hydrochloric acid. In the normal stomach the action of the bacillus is inhibited by the increasing acidity, before any appreciable fermentation can be produced by the few bacilli swallowed with the food.

Where, in pathological conditions, the secretion of hydrochloric acid is absent or slight, and the presence of stenosis or dilatation with resulting stasis of the contents gives a long period for action to the bacillus, great multiplication of the bacilli and fermentation of large amounts of lactic acid occur.[73] This condition is most associated with carcinoma of the stomach, where the combination of the conditions of atrophy of the secreting structures and of stenosis is most common. It may occur in other conditions.[73]

Butyric acid is not a constituent of the gastric juice. It is formed from carbohydrate and milk foods by the action of several bacilli, among them the bacillus butyricus. Physiologically it may occur in the gastric contents after the ingestion of large amounts of carbohydrate foods or milk. After an Ewald meal the amount of butyric acid is never enough in the normal stomach to appear in the tests one hour after ingestion. In pathological conditions, however, lactic and butyric acids may be present in the contents.

The tests of butyric acid are as follows: 10 c.c. of the contents are shaken with 50 c.c. of ether, the ether drawn off and evaporated, and the residue dissolved in water. To this aqueous solution lumps of calcium chloride are added. If butyric acid is present in amount sufficient to be of pathological significance, globules of the acid will separate out in the solution. Butyric acid may be discovered also by adding to the contents alcohol and sulphuric acid, and heating. If butyric acid be present, the pineapple odor of its ethyl ester will be perceived.

Butyric acid, when present in the amount of ½ gramme per mille, gives a tawny-yellow color with ferric chloride. Where the acid is present in considerable amounts, it may be distinguished by the odor of the contents.

Acetic acid may occur in the gastric contents in the presence of abnormal fermentation of carbohydrates. It is never present in the normal contents after an Ewald breakfast. It is produced by the action of a unicellular organism (the Mycoderma aceti) upon the food.

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[73] Hammerschlag: *Archiv. f. Verdauungskrankheiten*, Bd. II, H. 1.

The test for acetic acid is as follows: 10 c.c. of the contents are shaken with 50 c.c. of ether, the ether drawn off and evaporated, and the residue dissolved in water. This aqueous solution of the ethereal extract is neutralized with sodic-hydrate, and a few drops of 10 per cent. neutral ferric chloride added. If acetic acid be present, a deep red color results. The acid may also be discovered by heating the contents with alcohol and sulphuric acid; the ethyl ester is formed, which can be recognized by the odor. When acetic acid is present in pathological amount, it can be recognized in the odor of the contents.

SUMMARY.

In summary, the chemical analysis of the gastric contents is conducted as follows:

(1) Reaction tested with litmus.

(2) Free acid is tested for Congo red.

(3) Test for free HCl with phloroglucin-vanillin. If negative or doubtful with this reagent, test with Boas reagent, 00 tropeolin, Töpfer's reagent.

(4) Test for lactic acid, De Jong method.

(5) Test for butyric acid.

(6) Test for acetic acid.

(7) Measure off 10 c.c. of the mixed contents; to this add 2 to 3 drops of phenothalein. To this mixture add decinormal soda-solution from a burette, testing a drop of mixture for free HCl by phloroglucin-vanillin after each addition of the soda. When a drop fails to give the Gunzberg test, record the reading of the decinormal solution present when the test was last obtained for the reading for total free HCl. Continue to add the decinormal solution to the same mixture, testing a drop after each addition with Congo-red paper for free acids and acid salts. Note the reading when the Congo red ceases to give even a slight brown color. At this point test a drop of the mixture with a drop of $\frac{1}{4}$ per cent. aqueous solution of alizarin. Continue adding the decinormal solution until a drop of mixture gives a pinkish-purple color with alizarin. Take the reading for the estimation of the total free acids and acid salts (*B*).

Where this alizarin test works, it is to be used as the index of these substances, the Congo test being simply an adjuvatant test. The alizarin test is, as a rule, from $\frac{1}{10}$ to $\frac{2}{10}$ of a cubic centimetre

decinormal soda-solution more delicate than the Congo (·036 to ·072 gramme per mille). In many cases the alizarin test is not clear, and in such cases the Congo test must be relied upon. (See last number of this JOURNAL, page 38).

Continue to add decinormal solution until a pinkish-red color appears permanently in the mixture. The reading at this point indicates the total acidity (A). Subtract B from A = total combined acid (C). Add D to C = total secreted HCl (E). Subtract D from B = total organic acids *plus* acid salts (F). Repeat this analysis to this point with a fresh portion of contents.

(8) Test 10 c.c. of the contents for acid salts by Leo's method. Estimate free acids *plus* acid salts in 10 c.c. of contents after the addition of 1 gramme calcium carbonate (see page 41). Subtract total acid salts (G) from *this* estimate of the total free acids *plus* acid salts (B_2) = total free acids (H). Subtract total free HCl (D) from total free acids (H) = total organic acids (K).

(9) Place 50 milligrammes of coagulated white of egg in 25 c.c. filtrate of contents at 40° C., and record time of disappearance of egg.

(10) Test for rennin and rennet zymogen by the tests given on page 44).

(11) If free HCl be absent, test for pepsin by the Hammerschlag method (page 43).

(12) If free HCl be absent, estimate the total combined HCl by the Mintz method (page 36).

The record for the second analysis for quantitative estimation of the total acidity, total for HCl, etc., may be taken as the final record. The quantitative tests for each of these substances may be made in separate portions of contents, if desired.

This is a summary of the complete chemical analysis of the gastric contents, as far as such analysis is suited to chemical work. It is unnnecessary, in many cases, to apply the complete analysis.

If a given contents shows free HCl present, no lactic acid, normal total acidity, and a normal period of digestion of the egg albumin, it is, as a rule, safe to conclude that no abnormality which can be discovered by further chemical analysis is present. At the same time a more complete insight into the particular condition of the digestive apparatus in such cases may frequently be obtained by the estimation of the separate acid factors or the full analysis. Where

the qualitative tests or the total acidity are abnormal further analysis is absolutely necessary—as the estimation of the amounts of separate acid factors and of the ferments.

II. RECORD OF THE ANALYSES OF THE GASTRIC CONTENTS OF FIFTY HEALTHY INDIVIDUALS.

The characteristics of the normal gastric contents, as investigated by the method described, have been, to some extent, outlined in the description of the method. Stated collectively, these characteristics are as follows:

Gastric contents expressed one hour after Ewald breakfast.

Total quantity of mixed contents, 36 to 200 c.c.

Total quantity of filtrate contents, 20 to 140 c.c.

Free hydrochloric acid, present.

Lactic acid, absent.

Butyric acid, absent.

Acetic acid, absent.

Proteids. Native proteids (albumin or globulin) are, as a rule, present in the filtrate in very slight traces. Acid albumin, present. Albumoses and peptones, present.

Carbohydrates. Starch is, as a rule, absent in the filtrate, but may be present. Erethrodextrin is frequently present. Dextrin and sugars are, in a majority of cases, the only carbohydrates present in the filtrate.

Total acidity of contents, 1·50 to 3 grammes per mille.

Total hydrochloric acid, 1·15 to 2·48 grammes per mille.

Total combined hydrochloric acid, 0·24 to 1·49 grammes per mille.

Total organic acids and acid salts, 0·20 to 0·88 grammes per mille.

Total free hydrochloric acid, 0·1 to 1·90 grammes per mille. Mean 1·12.

Period necessary to digest 0·005 gramme of coagulated egg albumin in 25 c.c. of contents, 2 to 3½ hours.

Pepsin present. Quantity, 80 to 90 per cent. Hammerschlag method (page 43).

Rennin present. Quantity, one-twelfth to one-fortieth dilution.

Rennet zymogen, present. Quantity, one-sixtieth to one one-hundred fiftieth dilution (by Friedenwald's tables, referred to on page 44).

The data just given are taken directly from the collected results

of a series of investigations of the normal digestion which I have this year conducted at the Harvard Medical School.[74] The subjects of the investigation were healthy young men between the ages of seventeen and thirty years, students at the school. The number of individuals examined was fifty. Such cases only were taken as had no symptoms of digestive disturbance at the time of examination, and no history of chronic or intermittent dyspepsia.

The investigation was conducted in the following manner: Each man took an Ewald test breakfast, consisting of one baker's roll and 300 c.c. of water in the morning, after a fast of twelve hours. One hour later the stomach-tube was passed and the gastric contents expressed by the Ewald method (page 32). The expressed contents were then subjected to an investigation after the method described in this paper, summarized on page

In each of the fifty cases the following determinations were made:

(1) Total quantity of mixed contents.

(2) Total filtrate.

(3) Presence of free hydrochloric acid.

(4) Presence of lactic acid.

(5) Total acidity.

(6) Total hydrochloric acid.

(7) Total free hydrochloric acid.

(8) Total combined hydrochloric acid.

(9) Total organic acids and acid salts.

(10) Presence of starch, of erethrodextrin, of dextrin.

(11) Presence of native proteids, of acid albumin, of albumoses or peptones.

In each of fifteen cases, in addition to the above, these determinations were made:

(12) Presence of butyric acid.

(13) Presence of acetic acid.

(14) Period necessary to dissolve 5 milligrammes of coagulated egg albumin in 25 c.c. of filtrate of contents at 40° C.

(15) Total amount of acid salts.

(16) Total organic acid.

The scheme employed in the analyses was that given in the summary of the method on page 98.

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[74] The data in regard to the pepsin and the rennin must be excepted from this statement. These are taken from the observations referred to on pages 43 and 44 of the last number.

In testing for free HCl, all four of the reagents mentioned in the detail of the method were used in order to test their relative delicacy and applicability.

The test used for lactic acid was the De Jong test.

The much-used Uffleman test, as also the Penzolt modification of this, were both used in each case, in order to test the relative accuracy of these tests by the De Jong.

The quantitative estimations were made in each case both upon the mixed contents and upon the filtrates. The method used in the quantitative work is that detailed in the description as the color-analysis method (page 37).

It is clear that the results obtained in this way are of value chiefly for comparative work. For example, the estimation of the total free hydrochloric acid is slightly less than the actual amount present, as the limits of the Gunzberg reaction test are at best, 0·05 gramme per mille. In the estimation of the total organic acids *plus* acid salts, by the subtraction of the total free hydrochloric acid from the total free acids *plus* acid salts, this 0·05 gramme per mille of HCl must therefore be included in the total of organic acids *plus* acid salts, making this total slightly too high. But such an error in the absolute amounts does not affect the value of the results for comparative work, since this error is a constant in all results obtained by this method.

The results in the fifty cases fall within regular and fairly circumscribed limits admitting of a definite classification.

The qualitative results, as regards the mineral and organic acids, are absolutely regular.

The quantitative results show a fairly wide range of variation in the different cases; excepting in one case (Case 17), however, these results correspond to a definite type.

The summary of results in the cases is as follows:

(1) Total quantity of contents: mean, 110 c.c.; minimum, 35 c.c.; maximum, 220 c.c. Twenty-five cases gave a quantity of 100 c.c. or more.

(2) Total quantity of filtrate: mean, 110 c.c.; minimum, 20 c.c.; maximum, 140 c.c. Eight cases gave 100 c.c. or more.

(3) Free hydrochloric acid. Present in all cases.

(4) Lactic acid. Present in no case.

The Uffleman test was obtained from the crude filtrate in eight cases.

The Uffleman test was obtained in the ethereal extract of the contents (Uffleman-Penzolt test)[75] in two cases, both of which had given the test in the crude filtrate. The De Jong test was obtained in no case. This would indicate that there were present in the contents in eight cases substances not lactic acid, which, to some extent, simulated the test for this substance in the filtrate. In two cases only were these substances soluble in ether.

Butyric acid; present in no case (15 cases).

Acetic acid; present in no case (15 cases).

Proteids; native proteids; present in slight trace in 46 cases.

Acid albumin; present in all cases in filtrate.

Albumoses or peptones (Biuret reaction); present in all cases.

Carbohydrate; starch present in six cases in filtrate; erethrodextrin present in 15 cases; dextrin present in 27 cases.

QUANTITATIVE ESTIMATIONS.

MIXED CONTENTS.

	Mean. per Mille. Grammes.	Max. per Mille. Grammes.	Min. per Mille. Grammes.
Total acidity of mixed contents	2.18	3·00	1·50
Total hydrochloric acid	1·66	2·48	1·15
Total free hydrochloric acid[76]	1·12	1·90	0·09
Total combined hydrochloric acid[76]	0·57	1·49	0·24
Total organic acids and acid salts	0·59	0·88	0·20
Total organic acids (15 cases)	0·45	0·61	0·15
Total acid salts (15 cases)	0·14	0·27	0·08

FILTRATE.

Total acidity of filtrate	2·04
Total hydrochloric acid	1·48
Total free hydrochloric acid	1·07
Total combined hydrochloric acid	0·41
Total organic acids and acid salts	0·56

A comparison of the quantitative results of the mixed contents and the filtrates shows, as you see, a lower average total acidity in

[75] *Deutsches Archiv. f. klin. Med.*, 1893–94.

[76] This low record of free HCl was found in one case (Case 17). The next lowest record was 1 gramme per mille. This Case 17 also gave the high combined acid record 1·39 grammes per mille; also the highest difference between contents and filtrate 1·23 grammes per mille. The total acidity and the qualitative results were normal. I have records of several pathological cases with a low free HCl like this case, which were relieved by administration of HCl. So low a record is not therefore always normal.

the filtrates. This difference appears from the results to be due principally to the smaller amount of combined acids which are present in the filtrates, the free acids, both mineral and organic, being practically the same in both contents and filtrates.

In several cases the total acidity of the contents and filtrates was the same; in all other cases the filtrate total was less. In one case the difference of the total acidity of contents and filtrate was 1·33 grammes per mille; in one case 0·56 per mille; in all other cases it was less than this. These examples serve to demonstrate the necessity of performing the quantitative tests with the mixed contents and not with the filtrates, as has been advised by several investigators. On this point my results are in accord with those of Martius and Luttke in their investigations of this subject.[77] The work of these authors shows, in addition, that different filtrates from the same contents give varying results.

The results of the investigation in individual cases may be seen in the following analysis, which I have taken from the fifty analyses:

Case I.—Total quantity of mixed contents, 150 c.c.

Free hydrochloric acid, present.

Lactic acid, absent.

Butyric acid, absent.

Acetic acid, absent.

Albumin, slight trace; acid albumin, albumoses or peptone, present.

Starch, absent, erethrodextrin, present.

Total acidity, 2·47 grammes per mille.

Total hydrochloric acid, 2·03 grammes per mille.

Total free hydrochloric acid, 1·37 grammes per mille.

Total combined hydrochloric acid, 0·66 gramme per mille.

Total organic acids, 0·35 gramme per mille.

Total acid salts, 0·11 gramme per mille.

Total quantity of filtrate, 105 c.c.

Total acidity (filtrate) 2·30 grammes per mille.

Total free hydrochloric acid, 1·37 grammes per mille.

Total combined hydrochloric acid, 0·40 gramme per mille.

Total organic acids, 0·40 gramme per mille.

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[77] Martius u. Luttke, Magensaure d. Menschen, *loc. cit.* See also on this subject Giegle u. Blas, *Zeitschr. f. klin. Med.*, Bd. XX; and Ewald, *Zeitschr. f. klin. Med.*, Bd. XX.

Total acid salts, 0·10 gramme per mille.

Period necessary to dissolve 0·005 gramme coagulated egg albumin in 25 c.c. of filtrate at 40° C., 2½ hours.

Case II.—Total quantity mixed contents, 205 c.c.

Free hydrochloric acid, present.

Lactic, butyric, acetic acid, absent.

Albumin, present.

Starch and erethrodextrin, absent. Achrodextrin, present.

Total acidity, 2·54 grammes per mille.

Total hydrochloric acid, 1·82 grammes per mille.

Total free hydrochloric acid, 1·15 grammes per mille.

Total combined hydrochloric acid, 0·67 gramme per mille.

Total organic acids, 0·49 gramme per mille.

Total acid salts, 0·27 gramme per mille.

Total quantity filtrate, 135 c.c.

Total acidity, 1·98 grammes per mille.

Total free hydrochloric acid, 1·20 grammes per mille.

Total combined hydrochloric acid, 0·22 gramme per mille.

Total organic acids, 0·37 gramme per mille.

Total acid salts, 0·19 gramme per mille.

Period of dissolution of egg albumin, 2¾ hours.

Case III.—Total quantity mixed contents, 55 c.c.

Free hydrochloric acid, present.

Lactic acid absent; lactic-acid test obtained in this case by Uffleman test on crude filtrate also in ethereal extract of contents (Uffleman-Penzolt), but not by De Jong method.

Butyric and acetic acid, absent.

Albumin, present.

Starch, present.

Total acidity, 2·18 grammes per mille.

Total hydrochloric acid, 1·38 grammes per mille.

Total free hydrochloric acid, 1·06 grammes per mille,

Total combined hydrochloric acid, 0·32 gramme per mille.

Total organic acid, 0·64 gramme per mille.

Total acid salts, 0·16 gramme per mille.

Total quantity filtrate, 28 c.c.

Total acidity, 2·03 grammes per mille.

Total free hydrochloric acid, 0·95 gramme per mille.

Total combined hydrochloric acid, 0·32 gramme per mille.

Total organic acid, 0·60 gramme per mille.

Total acid salts, 0·16 gramme per mille.

Case IV.—Total quantity mixed contents, 128 c.c.

Free hydrochloric acid, present.

Lactic acid, butyric and acetic acid, absent.

Albumin, absent.

Starch and erethrodextrin, absent; achrodextrin, present.

Total quantity filtrate contents, 50 c.c.

Total acidity, 1·72 grammes per mille.

Total hydrochloric acid, 1·31 grammes per mille.

Total free hydrochloric acid, 0·87 gramme per mille.

Total combined hydrochloric acid, 0·44 gramme per mille.

Total organic acids and acid salts, 0·41 gramme per mille.

Period of dissolution of egg albumin, 3½ hours.

Case V.—Total quantity mixed contents, 60 c.c.

Free hydrochloric acid, present.

Lactic acid, absent. Test obtained in crude filtrate with Uffleman's test, but not in ethereal extract or De Jong test.

Albumin, present.

Erethrodextrin, present.

Total quantity filtrate, 35 c.c.

Total acidity, 2·16 grammes per mille.

Total hydrochloric acid, 1·61 grammes per mille.

Total free hydrochloric acid, 1·37 grammes per mille.

Total combined hydrochloric acid, 0·66 gramme per mille.

Total organic acids and acid salts, 0·55 gramme per mille.

Case XVII.—Total quantity mixed contents, 60 c.c.

Free hydrochloric acid, present.

Lactic, butyric and acetic acid, absent by all methods.

Albumin, present; albumoses or peptones, present.

Achrodextrin, present.

Total acidity, 2·12 grammes per mille.

Total hydrochloric acid, 1·58 grammes per mille.

Total free hydrochloric acid, 0·09 gramme per mille.

Total combined hydrochloric acid, 1·40 grammes per mille.

Total organic acids and acid salts, 0·53 gramme per mille.

Total quantity filtrate contents, 25 c.c.

Total acidity, 0·79 gramme per mille.

Total free hydrochloric acid, 0·07 gramme per mille.

Total combined hydrochloric acid, 0·21 gramme per mille.

Total organic acids and acid salts, 0·51 gramme per mille.

A comparison of these results with those of other investigators shows a general agreement, except in regard to two conditions. These conditions are:

(1) The total quantity of gastric contents.

(2) The condition of the carbohydrate digestion in the stomach.

The total quantity of the gastric contents expressed one hour after the ingestion of an Ewald test breakfast from the normal stomach is placed by most writers on the subject of gastric disease as lying between 25 and 60 c.c. (Rosenheim, 25 to 60 c.c.; Leo, 25 to 60 c.c.; Hammerschlag, 30 to 40 c.c.).[78]

I have been unable to find any report of any definite sets of observations to serve as a basis for this generally accepted statement. The results are undoubtedly taken from the large number of cases these observers have examined in clinical work.

These writers say further, that a quantity of expressed contents of over 100 c.c. in a given case is suggestive of some affection of the motility of the stomach or of stenosis of the pylorus.

Boas states in his text-book that the total quantity of the filtrate upon the contents obtained one hour after the Ewald breakfast averages 40 c.c. in the normal stomach. The normal limits he places as 15 c.c. each way.[79]

He gives as the basis of his statement the results of the investigation of eight cases.

The results in the fifty cases which I have investigated are as follows:

The total quantity of the mixed contents expressed one hour after the Ewald test breakfast averaged 110 c.c.

The minimum amount was 35 c.c.

The maximum amount was 205 c.c.

Twenty-five cases showed a quantity of over 100 c.c.[80]

The total quantity of the filtrate averaged 66 c.c.

The minimum was 20 c.c.; the maximum, 140 c.c.

Eight cases showed a total filtrate of 100 c.c. or more.

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[78] See reference to Rosenheim, Leo, Hammerschlag, in last number.

[79] Boas: Diagnostik, *loc. cit.*

[80] These high amounts were obtained two and three times in the same individual.

These results differ considerably from those of Boas and from the statements of the other writers upon the subject.

They increase the limits of the normal variation and definitely contradict the conclusion that a total quantity, or even a total filtrate of the gastric contents of over 100 c.c. is indicative or suggestive of some pathological condition.

In regard to the condition of carbohydrate digestion in the normal stomach, the conclusion given by Ewald in his text-book is confirmed or acquiesced in, in practically all the text-books upon the subject.[81] Ewald's conclusion is that in the filtrate of the gastric contents expressed one hour after the Ewald test breakfast from the normal stomach, the starch is all transformed to achrodextrin. The presence of a blue color with the iodine test (starch) or a purple color (erethrodextrin), he considers indicative of hyperacidity of the contents.

In the fifty cases which I investigated, starch was present in the filtrate in six cases, erethrodextrin in fifteen cases, achrodextrin in twenty-seven cases.

The evidence of these results warrants the conclusion that erethrodextrin, or even starch, may be present in the filtrate of the contents of the normal stomach one hour after the Ewald test breakfast.

In regard to the qualitative results for free hydrochloric and for organic acids, all authors are in agreement.

In regard to the quantitative results there is practical agreement. Thus for total acidity we get the following set of figures:

TOTAL ACIDITY.

Ewald[81]	1·30 to 2·40
Leo[78]	0·73 to 2·19
Friedenwald[82]	1·40 to 2·29
Hewes	1·50 to 3·00

FOR TOTAL FREE HYDROCHLORIC ACID.

Mintz[83]	0·50 to 1·00
Friedenwald[82]	1·39 to 1·75
Hewes	0·10 to 1·90

For the test of digestive capacity with egg albumin Jaworski found that 5 milligrammes of coagulated egg albumin dissolved in

[81] Ewald: *Klinik der Verdauungskrankheiten*, 1891, s. 51.

[82] Friedenwald: *Medical News*, June 22, 1895.

[83] Mintz: *Wiener klin. Woch.*, Bd. XX, 1889. Bd. IX, 1891.

25 c.c. of filtrate of normal gastric contents in two or three hours at 40° C.

In considering these results in my case two facts must be borne in mind: (1) that the results were obtained exclusively upon healthy young men; (2) that the individuals utilized were all accustomed to partake of a hearty American breakfast at the hour at which they took the test meal.

In what way and to what extent these facts have influenced the results, it is impossible to determine. It is probable, however, that results obtained from individuals of all ages and both sexes would differ somewhat from these.[84]

These results were obtained upon individuals many of whom had never experienced the passing of the stomach tube. Some observers consider results obtained at the first passage of the tube as inaccurate, owing to the effect of the experience upon the nervous-control system of the patient. I have examined the contents obtained from these same individuals on subsequent occasions, in a considerable number of cases, and found the general averages and limits the same.

When all is said, however, data of this kind can be used as control data in a general way. For, as is well known in matters of physiological function, each individual is, to a certain extent, a law unto himself.

TREATMENT OF MORPHINE POISONING BY POTASSIUM PERMANGANATE.

By L. E. Sayre.

Two cases of successful treatment of morphine poisoning by the use of permanganate of potassium have come within my observation within the past few years, one of them quite recently. I should not consider it worth while to report these, were I not aware that there are many who were skeptical as to the antidotal value of potassium permanganate. I believe it has been nearly four years since Dr. William Moor (*Medical Record*, 1894) claimed this salt to be a new antidote for morphine.

Shortly after Dr. Moor's announcement was made, a case of morphine poisoning was brought to my notice, where immediate action

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[84] Abstract in Boston *Journal of Medical Sciences*, No. 11, 1897.

was necessary to save life. The patient had taken five capsules, one grain each, of what was supposed to be quinine, but was actually morphine sulphate. It may be stated that the young lady had filled the capsules herself from a bottle properly labelled, but through carelessness had not observed that it was not quinine. When the mistake was discovered, a messenger was sent to my laboratory asking for an antidote and for my assistance. A physician, Dr. F. D. Morse, was telephoned for, and an aqueous solution of permanganate of potassium was dispensed with proper directions; this was immediately administered. It was then 1 P. M. The poisonous effect of morphine at the time of the administration of the antidote was very apparent, it having been four hours since the full quantity of the morphine had been taken. At about 1.30 P.M. the physician arrived and administered hypodermically atropine $\frac{1}{100}$ grain; then a concentrated infusion of coffee was administered at short intervals. An emetic of mustard soon produced an evacuation of the stomach. After emesis had been established by the mustard, the coffee infusion could not be retained for any length of time upon the stomach. A hypodermic injection of strychnine sulphate $\frac{1}{50}$ grain was given in the course of a half hour, followed in an hour by $\frac{1}{60}$ grain of the same salt. By six o'clock in the evening the patient was allowed to have a short nap, from which she was easily aroused in twenty minutes. The pupils of the eye began to dilate, and at 9 P. M. she was considered entirely out of danger, and was able to enjoy the rest of the evening at a game of cards.

A still more remarkable case of morphine poisoning happened here on the 6th of January. A drachm bottle of morphine had been purchased and about thirty grains of this had been taken; first dose at 2.20 P. M. When Dr. Morse arrived, at 4 P. M., the patient was fully under the influence of the morphine. A 5-grain tablet of potassium permanganate was dissolved in water, and the patient was required to take as much of this as possible at once; this was followed by a hypodermic injection of apomorphine $\frac{1}{10}$ grain; this was administered at 4.15 P. M. The permanganate solution as it was expelled from the stomach (emesis soon being experienced) was wholly decomposed; $\frac{1}{100}$ grain of atropine sulphate was now administered hypodermically, and more permanganate solution given. This was retained but a short time, and was not decolorized when expelled from the stomach. Twenty minutes after-

ward $\frac{1}{30}$ grain of strychnine sulphate was administered hypodermically and, at 4.50, $\frac{1}{100}$ grain of atropine sulphate, and at 5.15 $\frac{1}{30}$ grain of strychnine sulphate similarly administered. Infusion of coffee was now given, this acting as an emetic. At 9 and 12 P. M. strychnine $\frac{1}{60}$ grain, *per orem*, was repeated. Patient was kept walking. After midnight, 1.30 A. M., the patient had some difficulty in breathing, but this symptom passed off gradually, and at 4 A. M. the patient was allowed to sleep. By 7 o'clock the next morning the patient was considered out of danger, and was left in care of family.

While the above cases do not prove conclusively that the permanganate of potassium was the one agent which produced antidotal effect, the physician above mentioned seems confident that, had he not administered the permanganate solution in the above cases, he would in all probability have lost these patients.

GLEANINGS FROM THE MEDICAL JOURNALS.

By Clement B. Lowe.

Dr. John C. Sundberg writes a very interesting letter to the *Journal of the American Medical Association* about "Asiatic Plagues and Cholera Centres." One item of it should be given a wide circulation. He says: "There are three very holy cities in this region where good Shiah Mahommedans choose to be buried, and thus it happens that some eight or ten thousand defunct immigrants, some of whom have been dead two or three years, pass annually through Bagdad on the way to their final resting-place. The coffins being leaky, putrid cadaveric liquid pours out through the seams and drops on the road, to there dry and scent the dust. Thus one smells the approach of a funeral caravan, with its three or four hundred corpses, for miles to leeward. They come mostly from Persia, and bring also with them great loads of the finest Persian carpets and rugs. From Bagdad these rugs, which have, perhaps, for twenty or more years been exposed, in inconceivably filthy homes, to the contagion of every known disease germ and other abominations, are now shipped to Europe and America, to henceforth adorn the parlors of the rich and undermine the health and shorten the lives of their children. Let the quarantine authorities take due notice thereof, and govern themselves accordingly."

The danger of self-medication was recently exemplified by the case of a woman who died in Brooklyn, N. Y., after taking a number of pills containing belladonna and strychnine. The woman, who was suffering from indigestion, received the pills from a young woman employed in a wholesale drug house in New York City, and was told by her to take one after each meal. Death was due to an overdose. —*New York Medical Journal*, December 11, 1897.

A PRESCRIPTION FOR GASTRIC ACIDITY.

Boas (cited in the *Journal de Medicine de Paris* for October 3d) recommends the following:

℞	Sodium sulphate,	30 parts.
	Potassium "	5 "
	Sodium chloride,	30 "
	" carbonate,	25 "
	" biborate,	10 "

M.—S.: Half a teaspoonful, in half a glass of warm water, three times a day, two hours before eating.

PLAGUE ATTACKS MONKEYS.

The bubonic plague, which is still raging in British India, has attacked a colony of monkeys near Hardwar. The local authorities are trapping and isolating the diseased animals.

ACCIDENT INSURANCE FOR STUDENTS.

At the University of Heidelberg all students doing laboratory work, and even those who attend experimental lectures in chemistry or physics, are required to take out an accident insurance policy covering casualities which are liable to occur in such institutions. Students who are unfortunate enough to be entirely disabled are to receive $500 per annum, with a corresponding allowance for lesser injuries. The premium, however, is low—but two and a half cents for lecture courses per semester.

TYPHOID FEVER AND CERTAIN GAMES.

An English practitioner, in writing to the *Lancet*, refers to the fact that many cases of typhoid fever occur in the autumn, and attributes the cause of the disease to games, such as marbles and peg-top, which are played in the street at this time of the year, after the cricket season is over. In playing marbles a boy frequently licks his fingers to prevent the marble slipping, and the whip-cord of a top is wet in the mouth for the same reason. In this way the germs are conveyed into the alimentary tract. The writer's theory

is borne out by the fact that the disease almost exclusively affects boys.

IVY POISONING.

Schonberg (*Philadelphia Polyclinic*, October 16, 1897) says that none of the remedies used in the treatment of ivy poisoning are specifics. All of them are designed to relieve the itching and burning and subdue the inflammation. Of almost equal value are: (1) saturated solution of boric acid; (2) fluid extract of Grindelia robusta, 1 drachm to 4 ounces of water; (3) aqueous solution of sodium hyposulphite, 1 drachm to the ounce; (4) Labarraque's solution, 25 to 50 per cent.; (5) black wash, diluted one-half with lime water; (6) bromine, 10–15 minims to 1 ounce of olive oil.

IRON BEER.

Jaworski has a beer containing iron, made at the Bukownia brewery, which he has found extremely beneficial in certain cases. The iron is readily absorbed in this form, the taste disguised, while the beverage is nutritious, containing more calorics than an equal amount of milk. It is a dark bock beer, composed of 4·07 per cent. alcohol; 8·03 per cent. extracted matters; oxygen, 0·21 per cent., and 0·0317 iron in the weaker; 0·0644 in the stronger beer. The hæmoglobin, number of corpuscles and the weight increased after a few days of its use.—*Therap. Woch.*, September 26.

The Use of Manganese in the Treatment of Dysmenorrhœa; with Report of Cases.—Donovan (*Medical News*, November 27, 1897). This is an original article, illustrated with several typical cases, which, apparently, prove that manganese is of great value in the treatment of dysmenorrhœa. It was given in the form of the black oxide, 1 to 5 grains, in pill form, three times a day, after meals. In some cases it was combined with the dried sulphate of iron and extract of nux vomica.

The Administration of Cod Liver Oil.—Bricemoret (cited in the *Journal des Praeticiens* for October 23d) recommends the following formula:

℞	Cod liver oil,	15 ounces.
	Syrup of tolu,	7½ "
	Tincture of tolu,	12 drops.
	Essence of cloves,	2 "

♏.—S.: A tablespoonful two or three times a day, the bottle being well shaken before the dose is poured out.

Influence of Alcoholism in the Father upon the Life of the Child.—Anthony (*Centrabl. für Gynækol.*, October 16, 1897) mentions a case of a healthy woman who was married at the age of seventeen years to a notorious drunkard, and who had by him, in her nine years of married life, five miserable little children, of whom four died within the first ten days after birth. The fifth one, by great care, was raised to the fourth year, when it also died. After this the woman was separated from her husband. She then married a healthy man, and had by him two children, the elder of whom grew to be four years old, and the younger, at the time of writing, was fourteen days old. Both were in perfect health. This great contrast between the children of different fathers plainly shows, inasmuch as syphilis was not present, that the alcoholism of the father of the first children destroyed their vitality.

Healthfulness of Cycling.—After a prolonged consideration of the subject, the Paris Medical Society has come to the conclusion that cycling is excellent exercise for healthy people, is very beneficial for those suffering from nervous disorders, but is undesirable for delicate people, who are liable to suffer from over-fatigue.—(*Medical News*, December 4, 1897.)

Ichthyol in the Treatment of Smallpox.—Cassenko (*Therapeutic Gazette*, November, 1897) recommends ichthyol as a local application in variola. The remedy was used as an ointment, made as follows:

℞	Ichthyol,	10 parts.
	Fat,	60 "
	Lanolin,	20 "

The lanolin may be replaced by chloroform, olive oil, glycerin, or the like, according to the individual case. The ointment was rubbed in three times a day as soon as the papules became visible. As a result, there was little or no tenderness at the seats of eruption, the temperature never rose high, and the desquamation was almost completed in three or four days from the maturation of the eruption (half the usual duration).

RECENT LITERATURE RELATING TO PHARMACY.

SPINDLE TREE (EUONYMUS EUROPÆUS, L.).

The spindle tree (Euonymus Europæus) is one of our native shrubs or small trees possessing great ornamental merit, which is overlooked by landscape gardeners. It is deciduous, but its broadly lanceolate leaves, of a wavy, irregular outline, with minutely serrated edges, turn, before they fall, to a deep, rich crimson. The small pale-green cross-like blossoms, which open in May, are inconspicuous; but the fruit, when ripe in October, has all the appearance of a flower of brilliant hues. The fruit, indeed, from its color and shape, is the most distinctive as well as most beautiful feature of the tree. Each berry is four-lobed and of a lively rose-pink. When quite ripe the lobes open, disclosing four large seeds covered with a deep orange-colored membrane, the seeds and the husk then presenting a curious but attractive contrast. The wood of the spindle tree is exceedingly tough, and the husks and stems of the berries partake of the same character, so that long after the leaves have fallen these remain to enliven the wintry landscape. Birds will not touch them, and with human beings they act as a strong emetic and purgative.

The wood is so compact and tough that it is hard to break and almost impossible to splinter. In the days of domestic industries, when every notable maid minded her wheel, it was in request for the making of spindles; hence its commonest name—a name by which it is known in Germany and Italy. It was also used for making the pointed ends of ox-goads, whence is derived another name of gatter tree, or prickwood. Chaucer calls the berries gaitre-berries, and in the Nonnes Preetes Tale recommends them against ague and the humors[1]. In Ireland it is called pegwood, because shoemakers use it for pegs for shoes. In France it is also known by the name of priest's cap, from the resemblance of the berry in shape to a biretta. Though goads and spindles are gone out of fashion, the wood is still employed in the making of a variety of small wares, such as skewers, toothpicks and fine pins for cleaning watches; and artists are said to prefer the charcoal prepared from the branches to any other, partly from its excellent quality and partly because it is easily effaced.

[1]Chaucer's plant is, however, generally supposed to be dogwood (Cornus sanguinea, K.).

The spindle tree is easily propagated either from seed or from cuttings. It seems to prefer a chalky soil and a mild climate, and consequently flourishes best in the southern counties of England. It is said to be rare in Wales; in Scotland it is almost unknown. A variety of the common spindle tree, bearing berries with white instead of pink husks, is occasionally found; but although the contrast between the white husks and the orange seeds is curious, the effect is less pleasing than that presented by the berries of the commoner sort.—*Kew Bulletin.*

BISABOL MYRRH.

Tucholka gives the following method for distinguishing between bisabol myrrh and the official drug: Six drops of petroleum ether extract (1 to 15) are mixed with 3 c.c. of acetic acid, and 3 c.c. of sulphuric acid added so as to form a lower layer. A rose-red color is developed at the line of contact, and after a short time the whole of the acetic acid layer is colored red, remaining so for some time. If the petroleum ether extract is more concentrated, the resulting color is brown. The official myrrh, treated with this reagent, gives only a slight rose coloration of the acid layer, which does not increase; the contact line of both fluids is first green, changing on standing to brown, with a greenish fluorescence. An analysis of bisabol myrrh gave: Gum soluble in water, 22·1; gum soluble in soda solution, 29·85; resin, 21·5; bitter principle, 1·5; ethereal oil, 7·8; water, 3·17; vegetable and inorganic matter, 13·4. The ethereal oil gave the above distinctive color reaction very markedly. By means of a modification of Wallach's method for the preparation of the hydrochloride of the terpenes, small, well-formed, tablet-shaped crystals, melting at 79·3, were obtained. The author calls this product "Bisabolene;" he is unable to identify it with any known terpene. It has the unusually high boiling point of 260° C. The red oil from which the crystalline hydrochloride was separated, when fractionated between 230° to 239°, gave the characteristic color reaction. The oil, no doubt, also contains alcoholic ester-like compounds, since benzoyl chloride reacts very violently with it on gentle heating. The resin removed by alcohol has a strong acid reaction. Two distinct acids were obtained, one of which furnished a soluble, and the other an insoluble lead salt.—*Pharm. Centr.*, xxxviii, 500, through *Pharmaceutical Journal.*

FORMALDEHYDE AS A DISINFECTANT.

In a communication to *The New York Medical Journal*, in its issue of October 16th, Alvah H. Doty, M.D., health officer of the port of New York, gives the results of a series of elaborate and carefully-conducted experiments, which were begun about a year ago and continued until the present time, in the New York Quarantine Station, for the purpose of ascertaining the value of formaldehyde as a disinfectant.

The tests were made with the view of ascertaining the penetrating action of the gas, as well as its germicidal action upon exposed surfaces; and, in order to accomplish this result, the micro-organisms used were not only exposed directly to the gas, but were placed inside of sterilized blankets, newspapers and other packages before exposure to the disinfectant. And in order to determine its efficiency for quarantine work, pathogenic organisms, which were kept at the highest degree of virulence, were used. These were the cholera, anthrax and diphtheria bacilli, and the bacillus of the plague.

The several sources now available for the production of formaldehyde gas for disinfection were enumerated by the author about as follows:

(1) From a commercial product, known as formaldehyde (formalin, formol), said to be a 40 per cent. solution of formaldehyde gas in water. The exact method of its production is not explained by the manufacturers. It occurs as a clear, colorless fluid, having a characteristic odor and very irritating to the mucous membranes of the eyes and respiratory tract.

(2) From the combination of the above-described formaldehyde solution (formalin) and chloride of calcium placed in a closed receptacle or autoclave. By the application of heat, the gas contained in the autoclave is given off in a dry state and conducted through a tube to the apartment to be disinfected.

(3) The generation of formaldehyde gas by the oxidation of methyl or wood alcohol in a lamp constructed for this purpose.

(4) By the heating of paraformaldehyde in the form of tablets (paraform).

A portion of the experiments were conducted on a disinfecting vessel provided with air-tight chambers. One of these is so constructed that a vacuum can be produced in it before the admission

of the formaldehyde gas, the articles to be disinfected being placed in the chamber before the vacuum is made, so that they will also be deprived of air. The remainder of the tests were made in a room in the laboratory of the quarantine department, which was made expressly for the purpose. It is almost perfectly tight, and is used as a standard in experimental work.

The author stated in conclusion that the results showed that formaldehyde cannot be depended upon for disinfection where deep penetration is required. It can, however, be depended upon to penetrate letters and other thin packages if placed in air-tight chambers. The importance of the vacuum deserves special mention, for, with all the other conditions the same, it was demonstrated that disinfection took place in the vacuum chamber, whereas without the vacuum the germicidal effect was not produced. Packages of the character just described are usually penetrated in a comparatively tight room.

In packages made of blankets, clothing, etc., the action of formaldehyde upon infected discs placed inside is uncertain and not always the same. As a rule, penetration does not occur; at least the organisms are not generally killed. This uncertainty would seem to decide the inefficiency of formaldehyde for deep penetration. For superficial disinfection, *i. e.*, of hangings, furniture, clothing, furs, silks, and other articles, which can be spread out and the surfaces exposed, formaldehyde is an agent of undoubted value, particularly as it does not, as a rule, injure the finest fabrics, and therefore may be safely used in an apartment furnished with delicate paper-hangings and furniture.

In considering the methods proposed for disinfection, the writer said that the use of a formaldehyde solution simply exposed on pans is not to be considered, provided other methods are available. The heating of pastilles of paraformaldehyde is a simple and effective method of securing the gas, although a comparatively expensive one. The lamp for the generation of formaldehyde by the oxidation of methyl alcohol is also an effective method. However, these methods have the disadvantage of being comparatively slow. In the use of the autoclave and the apparatus designed by the author, the formaldehyde is rapidly released and conveyed to the apartment to be treated; and, when this is finished, the instrument, which is operated from the outside, can be removed. In this way the mate-

rial to be treated is subjected to almost the entire volume of gas before any considerable leakage from the room occurs.

In addition the author reported that he had carefully inquired into the effect of the gas upon insects, fowls, guinea pigs, etc , when these were confined in an apartment during disinfection, and that in no case had death ensued, the time of exposure ranging from three to fifteen hours.

Ceylon Flora.—The untimely death of Dr. Trimen unhappily left his admirable "Handbook to the Flora of Ceylon" in an unfinished state. Two volumes still remain to be written, in addition to the three already published. Sir Joseph Hooker has most generously offered to undertake the preparation of these, and his offer has been accepted by the Government of Ceylon. The necessary materials and specimens have already been received at Kew from the Royal Botanic Garden, Peradeniya. More than thirty years ago Sir Joseph Hooker assisted Dr. Thwaites in his *Enumeratio Plantarum Zeylaniæ.—Kew Bulletin.*

Suggestions for the New Codex.—The various societies of pharmacy throughout France have been asked to contribute suggestions for the revision of the Codex, and a number of them have undertaken the task with much thoroughness. The Paris Society of Pharmacists has gone into the matter very closely, and as the members of the special committee of that body, elected for the purpose of studying the question, are largely composed of pharmacists in business, the suggestions made by them are interesting. They ask for the suppression of a certain number of preparations and substances, adding that although such a measure may appear radical, it seems justified when they are apparently abandoned alike by doctors and the public. Not only are some of them very little used at present, but in certain instances, such as medicinal beer, they are difficult to keep. Among the one hundred and one substances which they suggest should be omitted, are oil of absinthe, antiscorbutic beer, sugar of red cabbage, compound electuary of saffron, jelly of deer's horns, distilled water of elderberries, compound electuary of rhubarb, burnt sponge and sweet oil of eggs, calcined bones, pulp of dates, sugar of walnut, acetate of lime, and extract of lilies of the valley. On the other hand, by way of compensation, the Paris pharmacists draw attention to a number of products which appear to have won the right to a place in the Codex. These amount to about ninety, and include cascara sagrada, kola, glycerophosphate of lime, lanoline, salicylate of mercury, walnut leaves, liquid vaseline, artificial serums; also, silks, catguts, etc., with mode of preparation and sterilization. A table of maximum doses of medicaments is also suggested, as well as antidotes, to be printed after each poisonous substance.—*The Chemist and Druggist.*

EDITORIAL.

MINERAL PRODUCTION OF THE UNITED STATES FOR THE YEAR 1897.

The Engineering and Mining Journal, for January 1st, gives some very interesting statistics showing the production of metals and mineral products for the United States during the year 1897, and makes comparison with the corresponding figures for the year 1896. As many of these figures will interest our readers, we give a transcript of some of the more important ones.

Aluminum.—The production of aluminum in 1897 was 4,000,000 pounds, valued at $1,542,240, against 1,300,000 pounds, valued at $520,000, in 1896.

Barytes.—The production was 27,316 short tons, valued at $109,264, against 21,900 short tons, valued at $87,600, in 1896.

Borax.—The production in 1897 amounted to 18,000,000 pounds, valued at $900,000, against 15,258,014 pounds, valued at $762,900, in 1896.

Bromine.—The production in 1897 amounted to 487,149 pounds, valued at $125,953, against 550,285 pounds, valued at $143,074, in 1896.

Calcium Carbide.—The production in 1897 amounted to 1,925 short tons, valued at $134,750, against 860 short tons, valued at $48,000, in 1896.

Cement.—The production of natural hydraulic cement in 1897 was 7,721,215 barrels of 300 pounds, valued at $4,347,925, against 7,454,611 barrels, valued at $4,353,377, in 1896. The production of Portland cement in 1897 amounted to 2,100,000 barrels of 400 pounds, valued at $3,570,000, against 1,032,654 barrels, valued at $1,170,151, in 1896.

Coal.—The production of anthracite coal in 1897 was 49,537,675 tons, valued at $86,690,931, against 48,855,563 tons, valued at $88,105,837, in 1896. The production of bituminous coal in 1897 was 144,901,331 tons, valued at $118,699,151, against 137,516,631 tons, valued at $115,009,979, in 1896.

Coke.—The production of coke in 1897 was 11,774,273 tons, valued at $21,446,321, against 10,359,584 tons, valued at $17,271,871, in 1896.

Copper.—The production of copper in 1897 was 475,338,340 pounds, valued at $52,478,352, against 467,822,973 pounds, valued at $49,729,582, in 1896. Of the production just given for 1897, 60.5 per cent. was exported, and the remainder used at home. More than one-half the total product is now refined electrolytically.

Gold.—The production of gold for 1897 was 2,685,000 troy ounces, valued at $55,478,352, against 2,558,433 ounces, valued at $52,886,209, in 1896. The most important gold-producing state is now Colorado, which has surpassed California. The gold production of the Klondike is not included in this total, but is credited to Canada.

Iron and Steel.—The production of pig iron in 1897 was 9,491,796 tons, valued at $91,122,970, against 8,623,127 tons, valued at $91,577,619, in 1896. The production of steel was about 6,500,000 tons against 5,582,606 tons in 1896.

Lead.—The production of lead in 1897 was 194,530 short tons, valued at $13,931,348, against 174,792 short tons, valued at $10,381,843, in 1896.

Lead Carbonate (*White Lead*).—The production of white lead in 1897 was 96,197 short tons, valued at $8,657,730, against 95,068 short tons, valued at $7,802,267, in 1896.

Petroleum.—The production of crude petroleum in 1897 was 66,000,000

barrels, valued at $52,734,000, against 61,396,394 barrels, valued at $56,963,137, in 1896.

Phosphate Rock.—The production in 1897 was 890,000 long tons, valued at $2,694,058, against 878,689 long tons, valued at $2,643,706, in 1896.

Salt.—The production of salt (including both evaporated and rock salt) in 1897 amounted to 14,455,788 barrels of 280 pounds, valued at $6,385,750, against 13,354,573 barrels, valued at $5,540,098, in 1896.

Quicksilver.—The production of mercury for 1897 amounted to 26,079 flasks of 76½ pounds, valued at $991,002, against 29,863 flasks, valued at $1,104,997, in 1896.

Silver.—The production for 1897 amounted to 56,117,000 troy ounces, valued at $33,557,955, against 58,488,810 ounces, valued at $39,245,991, in 1896.

Soda (manufactured).—The production for 1897 amounted to 177,000 metric tons, valued at $4,071,000, against 158,975 metric tons, valued at 3,656,425, in 1896.

Sulphur.—The production for 1897 amounted to 1,690 long tons, valued at $34,645, against 2,800 long tons, valued at $64,200, in 1896.

Zinc.—The production for 1897 amounted to 100,103 short tons, valued at $8,247,544, against 77,637 short tons, valued at $6,074,219, in 1896.

Zinc Oxide.—The production of zinc oxide paint in 1897 amounted to 26,275 short tons, valued at $2,102,000, against 16,799 short tons, valued at $1,259,925, in 1896.

S. P. S.

IS THE APOTHECARY SHOP DOOMED?

Under the foregoing title the editor of the *Journal of the American Medical Association*, for December 25, 1897, predicts a gloomy future for the modern pharmacist. Coming from the official organ of the National Association the remarks should, perhaps, receive more than merely passing attention. We cannot believe, however, that the views expressed represent the sentiments of the great number of physicians who constitute the membership of that body. The writer delivers himself with the air of one who has suddenly grasped a new idea, and is in haste to give his discovery to the world. Whereas he has simply restated a very old subject. It is only necessary to consult the proceedings of the numerous pharmaceutical association meetings held during the past dozen years, to be convinced that this subject was long ago exhausted. The aforesaid editor sees commercial extinction for the pharmacists because "the physician has his medicines ready made; his pills, tablets, coal-tar combinations, organic compounds, elixirs, etc., are used as they come from the manufacturer." The "corner drug store" is not in a position to fill prescriptions accurately, because the proprietor, one clerk, and boy are so busy with the numerous other matters in such an establishment. This kind of reasoning puts them into the anomalous position of being too busy to do business. Finally, the following: "Even at present, very few pharmacists do more than act as agents for the wholesale druggist. They buy their tinctures and extracts, pills and plasters already made. Their infusions are water-diluted extracts; their waters are mixed essences. They have not the time nor the means to make their own preparations, and the chances are that the crude drugs they would make them from would be beneath the standard." This quotation does not sound like the leader in a reputable medical journal, but rather reminds us of

the advance "write-up" of a patent medicine in the daily newspaper, in which a tirade against the modern pharmacist is usually a prominent feature, and paves the way for something to follow. We are informed that "their waters are mixed essences," but what are "mixed essences," surely someone has a new method of making aromatic waters, and it should be given publicity at once.

The one matter more than any other which has revolutionized the modern pharmacist was not mentioned by the editorial critic, namely, the decline of the patent medicine. Some fifteen years ago, for commercial reasons, the nostrum was relegated to the back room and the cellar, and at first it was a severe financial blow, but pharmacists are recovering from this blow, and have found they are the better for the loss. With the patent medicine out of the way there is a brighter outlook for the pharmacist than for the physician. The former always had to be resourceful or get out of the business; the latter will find if he dispenses the tablets, pills and plasters of the manufacturer, that the public will soon knew as much as he, and medicate themselves, even if it should be with indifferent success. It is not the true practice of medicine to deal out ready-made tablets any more than it is true pharmacy to hand down nostrums. Everything in this world is in process of evolution. Pharmacy and medicines may change, but they cannot go out of existence.

Acquisitions to the Library of the Philadelphia College of Pharmacy.

In less than two years the Library of the College has acquired by purchase or presentation valuable portions of the libraries of Professors Maisch and Bastin and Dr. W. S. W. Ruschenberger. In the Maisch collection were numerous pamphlets and monographs, which had been received by him from foreign sources, and which it would be very difficult to duplicate. There were also a number of standard works on botany and chemistry, mostly in the German language, which are valuable as works of reference. The portion of Dr. Ruschenberger's library received contained a number of scarce serials, and of older editions of dispensatories, etc., which are of especial interest and value from a historical standpoint.

The latest collection, that of Professor Bastin, consisted of nearly 150 volumes relating almost exclusively to botany and microscopy. Probably the most notable of these are "Dictionaire de Botanique," Baillon, four volumes; Kohler's "Medicinal Pflanger;" "Historie des Plantes Venénenses et Suspectes de France," Bulliard, two volumes; "Atlas Manuel de Botanique," Deniker; "Arboretum et Fructicetum Brittanicum," London, seven volumes; "Botanique Medicale," Baillon; "American Dispensatory," Coxe, 1818. Many of these works are handsomely illustrated.

THE PHILADELPHIA MEDICAL JOURNAL.

When the *Medical News* took up its abode in New York, there was felt to be a void in medical literature in this the most renowned medical centre on the American Continent. A half a score of journals proclaimed themselves as individually able to fill the vacancy, but it was apparent that none of them quite "sized up" to the position. The natural outcome was a new medical journal founded by a number of gentlemen representing the leading medical

schools of the city. The first number appeared on New Year's Day, and successive numbers will appear weekly, we trust with constantly increasing prosperity. One can hardly fail to recognize it as the editorial work of Dr. George M. Gould, the former editor of the *Medical News*. His writings possess a certain clear-cut terseness that makes them interesting as well as instructive.

This journal purposes "to draw the line against all nostrums in its advertising columns, and we wish it success in this laudable determination, as well as in every other effort towards clean journalism.

NINTH INTERNATIONAL CONGRESS OF HYGIENE AND DEMOGRAPHY.

We have received from the Secretary-General, Prof. Dr. Amalis Gimeno, of Madrid, Spain, the rules, programme, etc., of the exhibition which is to be held concurrently with the Congress at Madrid from the 10th to 17th of April, 1898. The exhibition will be divided into ten classes, as follows: (1) Didactic Hygiene; (2) Prophylaxis of Transmissible Diseases; (3) Urban Hygiene; (4) Hygiene in Relation to Dwelling Houses; (5) Hygiene in What Refers to Exercise and Work; (6) Naval and Military Hygiene; (7) Hygiene of Infancy and Schools; (8) Food and Dressing; (9) Demography and Statistics; (10) Miscellaneous. Those wishing to apply for space should address Dr. Gimeno as above.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

NOZONI DI ANALISI CHIMICA, E CENNI SULL' ANALISI DELLE ACQUE POTABILI, Del Dott. Icilio Guareschi, Professore ordinario di Chimica Farmaceutica e Tossicologica nella R. Universita di Torino. Unione Tipografico, Editrice, Torino, 1898.

This book of 172 pages is Vol. III, part 2d, of the author's *Commentario della Farmacopea Italiana*. The author is already well-known through his work on the alkaloids, the German translation of which, by Dr. Kunz Krause, was noticed in this JOURNAL during the past year.

The present work is to a certain extent based on the analytical scheme of Fresenius, but it contains many additions which make it of especial value to pharmacists.

After the introduction, there is a section devoted to general considerations in which the behavior of reagents and general operations are thoroughly described and illustrated in the latter case with numerous figures. Part I describes the action of reagents on the salts of the seven groups of bases and on the salts of the inorganic and organic acids. A number of acids are studied which do not usually find a place in books on analytical chemistry.

Part II is devoted to systematic analysis, in which the bases are divided into groups by the usual group reagents, and then separated into individual members. This, however, is prefaced by a preliminary examination in the dry way, and with some directions as to the methods of getting substances into solution. The acids are detected individually, without much attempt to classify them into groups.

A short section is devoted to microchemical analysis, in which a large number of illustrations show the appearance of numerous salts under the microscope; this also includes the appearance of such compounds as starch, inulin,

calcium oxalate, calcium phosphate, aleurone, various coloring matters, etc., in plant tissues.

Finally, Part III is devoted to the analysis of potable water. Nearly all previous writers on this subject receive some consideration at the hands of the author, and the illustrations are well chosen and of a high order, as in all other parts of the book. The estimation of the various gases in water receives careful attention. The whole book is modern, and the bibliographical references are very full. A short biographical sketch of an author quoted is often appended in a foot-note.

ELEMENTS OF LATIN, for Students of Medicine and Pharmacy. By Geo. D. Crothers, A.M., M.D., Teacher of Latin and Greek, St. Joseph (Mo.) High School, and Hiram H. Brice, A.M., Instructor in Latin and Greek, Boys' High School, New York City. The F. A. Davis Company, Philadelphia, New York and Chicago, 1898.

Any book that will aid pharmacists in acquiring a better knowledge of the Latin language should meet with a hearty welcome. The present work is not intended as an introduction to the Latin language and literature, and is therefore only available to those who already have some knowledge of the language. To such, however, it appears capable of serving a good purpose, as it was designed to present, within the briefest possible compass, those principles of Latin etymology and construction which are essential to an intelligent use of the terminology of pharmacy and medicine. The declensions and conjugations are given in an abbreviated form. The chapter devoted to prescription writing contains much that is useful, and some valuable advice is given on the subject of abbreviating Latin names in prescriptions, and a number of examples are given where such practice may lead to serious error. We believe this book should have a place in every prescription department.

DESCRIPTIONS OF THREE NEW SPECIES OF AUSTRALIAN PLANTS. BY J. H. Maiden and E. Betche. Reprint from the Proceedings of the Linnean Society of New South Wales, May 26, 1897.

The new species studied and named by the authors are Dodonæ Camfieldi, of the natural order Sapindaceæ; Helipterum microglossum, of the Compositæ, and Leucopogon Fletcheri, of the Epicrideæ.

NOTES FROM THE BOTANIC GARDENS, SYDNEY. By J. H. Maiden and E. Betche. Reprint from the Proceedings of the Linnean Society from New South Wales, May 26, 1897.

This consists of notes on rare Port Jackson plants, and plants from New South Wales.

MINUTES OF COLLEGE MEETING, DECEMBER 27, 1897.

The quarterly meeting of members of the College was held this day at 4 P.M. Charles Bullock presided. Nineteen members registered names. The minutes of the previous stated meeting were read, and, on motion, adopted. The minutes of meetings of the Board of Trustees for October, November and December were read and approved. The Secretary referred to the application which had been made to this College to furnish a draft of proposed uniform

pharmacy law for all the States, and stated that action upon this had been postponed from time to time. The subject being discussed, it was, on motion, resolved to now postpone action indefinitely. Mr. Geo. M. Beringer, chairman, presented the report of the Special Committee appointed to consider the questions in the authority of the College to restrict those members of the Faculty and all others who receive salaries or perquisites for services in their right to vote as members of the Board of Trustees, which question, on its constitutionality, had been formally referred to the Solicitors of the College for a legal opinion, said opinion sustaining this authority. This report, after a calm, deliberate and most impartial consideration of all the phases which the subject presents, concludes with the following preamble and resolution :

WHEREAS, The question of restricting the eligibility of members of the Board of Trustees to such members only as do not receive remuneration for service rendered the College has been under discussion for some time, and the opinion of the Solicitors affirms that such restriction is in the power of the College to adopt, and would be reasonable and valid, and,

WHEREAS, The rapid growth and increase of departments have changed the condition of College management so that we are convinced that the custom brought about by the founders of electing the Faculty to membership in the Board of Trustees is a conservation of force, which, eventually, must prove detrimental to the progress and proper business-like management of this institution. Therefore, be it

Resolved, That we recommend that this custom be discontinued, and that hereafter no member receiving any emolument for services rendered the College be eligible for membership in its Board of Trustees. We would recommend, however, that the conditions of this resolution be not applied to any of the present Trustees.

Report signed by

GEO. M. BERINGER,
EDWIN M. BORING,
CHAS. A. WEIDEMANN,
WILLIAM L. CLIFFE,
F. W. E. STEDEM,
Committee.

On motion being called for in regard to disposition of this report, Dr. Lowe moved its acceptance, and that it be considered open for discussion. The discussion which ensued thereupon was warm and spirited, Dr. Lowe, Mr. Ross, Mr. Beringer, Mr. McIntyre, Mr. Procter, Professor Sadtler, Professor Remington, Mr. Buckman, Mr. Kline, Mr. Chas. A. Heinitsh, Mr. Trimble, Mr. Cliffe, Mr. Ellis and Dr. Weidemann participating. When the chairman put the question upon the adoption of the report, it was negatived by a vote of 18 to 8.

The Secretary read the resignation of a member, and Mr. Kline proposed that action be deferred to enable him to exercise his power of persuasion in inducing him to recall his declination. The reading of a note of regret of Mr. Jos. L. Lemberger, expressing inability to be present, closed the proceedings, and the meeting adjourned.

WILLIAM B. THOMPSON,
Secretary.

NEW YORK COLLEGE OF PHARMACY.

VANILLA.

The meeting of January 18th was devoted to the subject of vanilla. Prof. Rusby introduced the discussion by giving a general account of the distribution and habits of vanilla plants and the cultivation and curing of the bean.

At the present time thirty-three species of vanilla are recognized by the *Index Kewensis* The New World contributes eighteen species; three from Mexico, five from the West Indies, two from Guiana, three from Brazil, three from Peru, and one each from New Granada and Ecuador. A plant which Dr. Rusby collected in Bolivia may belong to one of the Peruvian species, or it may constitute an additional one. In the Old World fifteen species are known; four from Tropical Africa, three from the East Indies, two from Java, and one each from Ceylon, Sumatra, Bourbon, the Seychelles, the Philippines, and the Malay Peninsula. Dr. Rusby has observed Orchidaceous fruits in another genus, closely related to vanilla, having a strong vanilla odor, evidently due to vanillin. The curing and cultivation of vanilla were illustrated by dried specimens of the plants, by colored lantern slides showing the different stages of curing, the structure of the flowers and the methods of artificial pollenation.

Professor Jelliffe described the microscopical structure of the fruit, and named two species of moulds found on some fruit.

Professor Coblentz followed with a very full resumé of the chemistry of vanillin and the complicated processes connected with its manufacture at different times and by different makers.

The discussion was concluded by Mr. Oscar Kalish, who considered vanilla preparations and their use at the soda fountain. His remarks were illustrated by specimens of extracts carefully prepared according to the several formulas to which he referred

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MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, January 18, 1898.

At the regular monthly Pharmaceutical Meeting of the Philadelphia College of Pharmacy, the Registrar called attention to the very handsome specimen of Kola nuts, both white and red, which has been obtained by Mr. Joseph W. England from Messrs. F. Stearns & Co., of Detroit, Mich. Attention was called to the fact that the color was admirably preserved by the 90 per cent. glycerin. Specimens of quilled Cascara Sagrada of beautiful quality from the same firm were also presented.

Specimens of Malt in powder from Messrs. John Wyeth & Brother were presented. These were prepared in vacuum pans and consequently uninjured by the process of evaporation.

Specimens of Antimony ores were presented by Messrs. McIlvaine Brothers, of Philadelphia.

A lot of railroad iron, asphalt, oakum, etc., weighing some thirty pounds, was exhibited, which had been taken from a case of opium recently received by a Philadelphia importing firm. The steamship company was held liable in this instance for what appeared to be a case of theft or substitution during transportation.

Professor Lowe then introduced Mr. F. B. Kilmer, of New Brunswick, N. J.,

to the meeting. He gave a most interesting account of his trip to the "Land of Ginger"—the Isle of Jamaica. The lecture was illustrated by photographic views thrown upon the screen by the electric lantern, which enabled the speaker to give an admirable and vivid description of the life, homes and land of the growers of ginger, see page 65 of this number.

A vote of thanks was unanimously given to Mr. Kilmer for his lecture.

T. S. WIEGAND,
Registrar.

NOTES AND NEWS.

A New Monthly Journal on Food Products and Allied Subjects has made its appearance. The valuable periodicals known as *Forschungs Berichte* and the *Jahresbericht über Fortschritte der Nahrungs und Genussmittel*, which were edited by Dr. A. Hilger and other collaborators, have been combined under the title *Zeitschrift für Untersuchung der Nahrungs-und Genussmittel.* The editors of the new journal are the well-known chemists Drs. K. v. Buchka, A. Hilger and J. König. Several original articles and a number of extracts appear in the first number, the whole comprising eighty pages of reading matter.

Reported Discovery of Strontium.—The discovery of a large bed of strontium at Put-in-Bay Island, reported from Toledo, has awakened a considerable amount of interest among the manufacturers of fireworks, as it is thought likely that it will result in a considerable reduction in the price of a fireworks in which strontium nitrate or strontium carbonate is used. One large manufacturer of fireworks in New York, who makes use of about 150 tons of strontium nitrate in a year, and imports the whole of it from Europe, states that it costs his firm now about 7¼ cents a pound. If the strontium should be found in large quantities, it would have the effect of lowering the cost of certain classes of fireworks, that is, all those that use a red or crimson light. At present the supply comes chiefly from Germany, and the American manufacturer has to pay a high price for it —*Scientific American.*

A call has been issued for a *Pure Food and Drug Congress*, to meet in Washington, March 2d, and to continue in session as long as the business before the convention may warrant. The movement originated with members of the grange, and has gradually spread to other organizations interested in pure foods.

The governors of each State are empowered to appoint 10 delegates each, divided as follows: Agriculturists, 4; pharmacists, 2; wholesale grocers, 1; retail grocers, 1; food manufacturers, 1; proprietary manufacturers, 1.

The governor will also appoint two delegates for the Department of Agriculture, and two to represent the Dairy and Food Division of the Department of Agriculture.

All State boards of health, boards of trade, granges, alliances, horticultural and agricultural societies, and sundry other organizations, are invited to appoint from 1 to 5 delegates.

Tampico Jalap.—Ordinary jalap, the "Purgo macho" of the Mexicans, is widely known as a medicinal substance, and the plant (Ipomœa purga,

Hayne) with purplish-pink flowers is met with under cultivation, not only in greenhouses in Europe, but to some extent as a field crop in the neighborhood of the Cinchona Plantations, in the Nilgiris (Madras) and the Blue Mountains, Jamaica, Tampico jalap, on the other hand, which has made its appearance in trade of recent years in considerable quantity, is produced by a different plant (Ipomœa simulans, Hanbury). It is stated to grow along the mountain ranges of the Sierra Gorda, in the neighborhood of St. Luis de la Paz, from which town and the adjacent villages the roots are carried to Tampico, and thence shipped abroad. As Tampico jalap was not represented amongst the plants in the Economic Collections at Kew, an effort was made to obtain a few tubers through the foreign office, who enlisted the kind co-operation of Her Majesty's Minister in Mexico. In November last, two lots of tubers were received in excellent condition from Her Majesty's Consul at Vera Cruz, labelled respectively "Tlacolulam" and "Tonayan," and described as having been obtained from these localities "in the Canton of Jalapa, in the State of Vera Cruz." The Tlacolulam tubers were distributed to the botanical departments at Jamaica and the Nilgiris, and to the botanic gardens at Oxford, Cambridge, Edinburgh, Glasgow, Glasnevin and Trinity College, Dublin. The Tonayan tubers (a small lot) were distributed to Jamaica and the Nilgiris only. It was at once noticed that both these tubers were not obtained from the locality where Tampico jalap is collected, and now there is little doubt that they are ordinary jalap (Ipomœa purga). This fact should be carefully noted by the recipients. In the meantime another effort is being made to obtain the tubers of the true Tampico jalap.—The *Kew Bulletin*.

OBITUARY.

Dr. Campbell Morfit, a distinguished American chemist, died in London, England, December 8th.

Dr. Morfit was born in Herculaneum, Mo., on November 19, 1820. His education was partly obtained at Columbian University, Georgetown, D. C., but he left there before graduation to take up the study of chemistry in the private laboratory of James C. Booth, in Philadelphia. Subsequently he engaged in the manufacture of chemicals, and in 1854 became Professor of Applied Chemistry in the University of Maryland. In 1858 he removed to New York, where he remained until 1861, when he went to London.

Dr. Morfit did considerable research work while in this country, but, after his residence abroad, devoted himself more particularly to the improvement of technical processes. He was a member of various scientific societies, including the Chemical Society of London and the Institute of Chemistry. Besides writing numerous scientific papers, he was joint author with James C. Booth of a report to the United States Ordnance Department on gun metal, in 1858, from investigations by him in a laboratory that he established on his own plan at Pikesville Arsenal, Maryland. He was co-editor with Dr. Booth, of the *Encyclopædia of Chemistry*. He also published the following: "Chemistry as Applied to the Manufacture of Soaps and Candles," "Chemical and Pharmaceutical Manipulations," "Pure Fertilizers and Phosphates," "The Arts of Tanning and Curing," "Perfumery: Its Use and Manufacture," "Oleic Soaps" and (with Dr. Booth) "Progress of Chemical Arts."

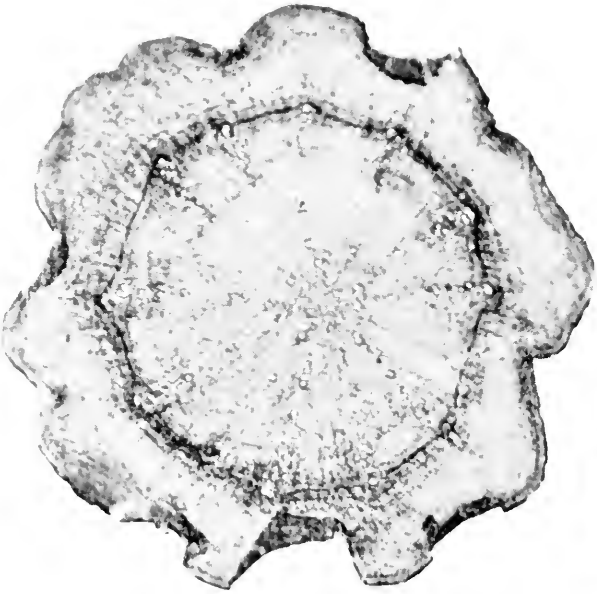

FIG. 1.—Cross-section of Canaigre Root. x 5½ diameters.

FIG. 2.—Cross-section of Chinese Rhubarb. x 5½ diameters.

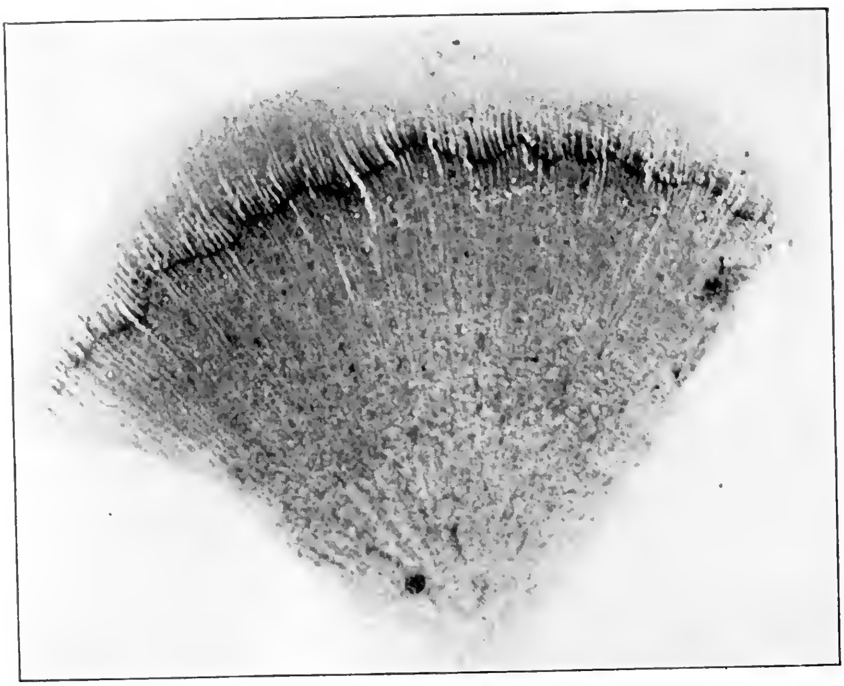

FIG. 3.—Cross-section of Rheum Rhaponticum. x 5½ diameters.

THE AMERICAN

JOURNAL OF PHARMACY

MARCH, 1898.

A BRIEF STUDY OF THE RHUBARBS AND A PROBABLE ADULTERANT.

By L. E. Sayre,

Member of Research Committee C of Revision Committee of the United States Pharmacopœia.

Problem twelve proposed by the Committee on Revision of the Pharmacopœia for 1900 reads: "Rheum—distinguish from Rhaponticum and from Rumex hymenosepalus," the drugs being in the powdered state. The object of this paper is to present the investigations of the author upon the line of work indicated in the query. For the purpose of the study, both microscopical and chemical methods have been employed, and will here be described; and since the greater part of the research has been accomplished by the use of the optical instrument, the methods used and the results obtained by it will first be considered.

In connection with this subject I need only remark that the line of work laid out in former contributions has been adhered to in the present instance. Authentic specimens having been obtained from the Chairman of the Committee, they were carefully prepared, sectioned, and the elements studied in their normal relations to each other. With a thorough knowledge of the structure thus obtained, the drugs in the powdered condition were then observed, and the prominent characteristics noted. Drawings and photographs were made, and appear with this article. It is best, I think, to state here that although the specimens used are doubtless thoroughly representative, care must be used in drawing too general conclusions from the re-

sults obtained on account of the limited number of specimens. For the same reason the paper can be considered merely a preliminary one, subject to such corrections as more detailed study of the subject may indicate. The purpose for which the investigation has been conducted is to discover, if possible, some test whereby the substitution of inferior grades of rhubarb for the better one, or admixture with a foreign drug, may be detected.

A study of the true Rheum shows that it is characterized by several features peculiarly its own. Yet despite this there is no exact information, so far as I know, concerning the true botanical origin of the drug. It is commonly ascribed to *R. officinale* and *R. palmatum*, and there is little doubt that one or both of these contribute the major portion of the commercial rhubarb. If but one be the source, then which it is, I think, cannot be said to a certainty.

Rheum officinale is, perhaps, the one usually considered as furnishing the true rhubarb. It is a native of Southeastern Thibet and possibly of China also. In appearance it considerably resembles the ordinary garden rhubarb, with which it has been cultivated in Europe, but differs from it in several particulars. *R. palmatum* is indigenous to Northwestern China. It first became known to Europeans in 1750, and received a description from Linnæus in 1762. Like *R. officinale* it has been cultivated in foreign countries, the first having been grown in England in 1765.

Rheum rhaponticum, European rhubarb, is the source of the cheap variety of rhubarb. It is a native of Southern Siberia, and is closely related to *R. undulatum*, the common garden variety. Like that, too, it is easily cultivated, and the commercial source of the drug is the gardens of Europe.

These various kinds of rhubarb, although comparatively recent additions to the materia medica of the Occident, have long been known and used by the Chinese. Specific mention of the drug is found in their writings as far back as 2700 B.C. They still collect and prepare it as they did in the early days, and Chinese rhubarb is the synonym for the best quality of the commercial article.

Rumex hymenosepalus is a member of the same natural order as *Rheum*, but is a native of the western hemisphere. It has recently come into prominence because of the use to which its tannic acid has been applied. Since this article has to do chiefly with the rhubarbs, no further treatment will be accorded the canaigre. Those

interested in the subject, however, will find a good account of the plant in Professor Trimble's work on the tannins.

The samples of Chinese rhubarb used in the present examination presented the usual fusiform outline and mottled surface. On close examination this latter effect is observed to be due to alterations of a dirty white and a brownish-yellow tissue, and in these colors is particularly observable in fresh fractures or cuts. If such a surface be moistened, though, the white is observed to turn a light, bright yellow, and the former yellow to a striking dull orange color, thus darkening the whole effect. Somewhat the same thing happens by exposure to the air. An observation of a freshly-cut and moistened surface shows that the tissues in numerous places are aggregated into contorted groups, to which effect the mottled or marbled appearance is due. Thin sections show that the lighter groundwork tissue is composed of thin-walled parenchyma cells, while the dark and contorted areas are principally fibro-vascular tissue. The latter, in certain forms of the drug, is regularly arranged into spots having a radiate structure and forming the so-called stellate spots or "Masern" of the Germans. Recent writers state that these are particularly characteristic of the Russian variety, which is no longer on the market. The accompanying drawing (*Fig. 4*), adapted from Berg, illustrates the effect.

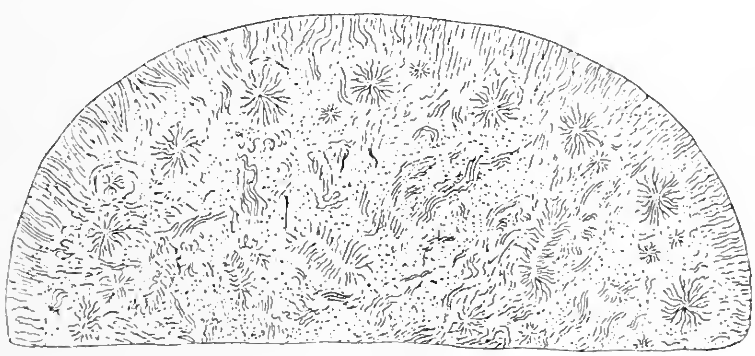

FIG. 4.—Cross-section of Rheum, after Berg.

This peculiar structure is due to the method of growth, whereby the numerous rudimentary leaves on the surface of the rhizome leave the form of their fibro-vascular growth as a permanent record on the parent stem. In the specimens examined this structure did not make its appearance, and I think it will be found that, in its typical form, it rarely does. What really was found was a massed

irregularity of the fibro-vascular tissue in certain areas, as shown in the half-tone reproduction of a photomicrograph (*Frontispiece, Fig.* 2). This doubtless corresponds to the stellate structures of the Russian, but it is not carried out to the same extent.

The *Rhaponticum* (*Frontispiece, Fig.* 3) in the particular just mentioned, presents an entirely different aspect, as is easily distinguished from either variety of the Chinese rhubarb. There is a distinct and plainly-marked radiate structure, unbroken by such an arrangement of the vascular tissue as is so apparent in the true rhubarb. As will also be observed, the paring of the rhizome did not extend down to the cambium line, which appears as a dark line in the figure. The parenchyma here is also thin-walled.

Under higher magnification, the cell contents of the tissues become manifest. In both the *Rheum officinale* and the *rhaponticum* the elements observed are starch grains and calcium oxalate crystals. Of these more extended mention will be made when the powdered form of the substances is considered. *Rumex hymenosepalus* in the gross and in section offers no points of comparison to the species of *Rheum*. The roughly-wrinkled root is of a dark, krameria-red color, and possesses no trace of the characteristic rhubarb odor. The taste is sharply astringent, and in no wise mucilaginous and disagreeable like *Rheum*. The gritty feeling when ground between the teeth is also absent. In section (*Frontispiece, Fig.* 1) it presents the typical form of a simple root. The thin-walled parenchyma occupying the whole extent of the section is marked off into two areas by the concentric cambium line, in such a manner that the inner central one occupies about two-thirds the diameter of the section. Radiating from the center to the cambium line are about twelve groups of tracheary vessels.

In the form of powders the *Rheums* and the canaigre are not easily differentiated, yet a careful examination will not fail to show the presence of the latter, even when mixed with other drugs. The distinction of *R. officinale* and *R. rhaponticum*, however, is a different matter, and the author was not able to select any salient microscopical feature that would serve to distinguish them apart, either individually or in mixtures. But a chemical test was found, which will be described later on.

In a No. 60 powder of either rhubarb the most striking elements observed are the starch grains and calcium oxalate crystals, to

which a more careful study adds the fragments of pitted vessels, and crystals of chrysophanic acid. The cell walls of the parenchyma hardly appear at all, and when present are mere fragments. These common elements offer little means for basing a distinction between the two *Rheums*, since in size and form they differ so little. The only distinction observed was the greater number of starch grains in the *rhaponticum ;* but this could hardly be used as point of distinction, since it is such a variable character. Numerous measurements of starch grains and the calcium oxalate crystals were made and gave the following averages: Starch, Chinese, ·02646 mm. (*Fig.*

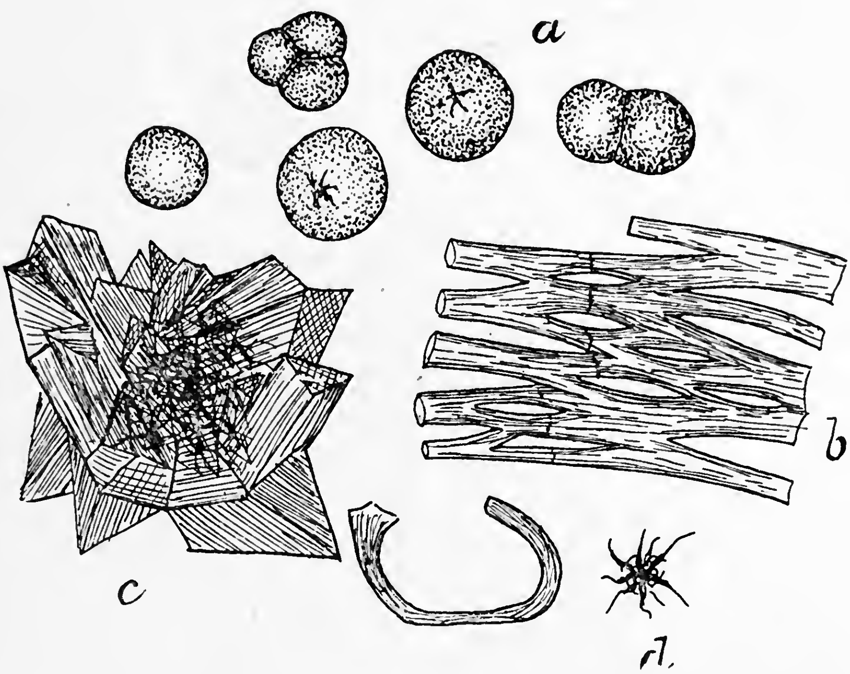

FIG. 5.—Chinese Rhubarb. x 450 diameters. *a*, starch ; *b*, fragments of pitted vessel ; *c*, calcium oxalate ; *d*, chrysophanic acid.

5); *rhaponticum*, ·0216 mm. (*Fig. 6*); Calcium oxalate crystals, Chinese, ·0716 mm.; *rhaponticum*, ·0683 mm. Both elements are thus seen to be larger in the Chinese form, but the difference is not such a one as could be used as a test.

The powder of *Rumex hymenosepalus* is marked particularly by the size and form of the starch grains (*Fig. 7*). These are long and slender in form, and exhibit a long, branching hylum, which extends throughout the major portion of the long diameter. The presence of these in a sample of rhubarb powder would at once show that it was adulterated with canaigre, since they differ entirely in form and

size from the *Rheum* starch. A No. 60 powder of this substance also exhibits a much larger proportion of the parenchyma *débris*, the cells of which are much larger than those of the *Rheums*.

The distinction between the two forms of rhubarb that could not be made out by the use of the microscope appeared very distinctly under the influence of chemical reagents. Normally, the two powders differ materially in their appearance. For instance, the Chinese gives a fine, soft powder of a distinctly pure yellow color, and with the odor that is so characteristically that of rhubarb; while the *rhaponticum* affords a granular, pinkish-yellow powder, the odor of which is not so strongly rhubarb-like, but is more woody in char-

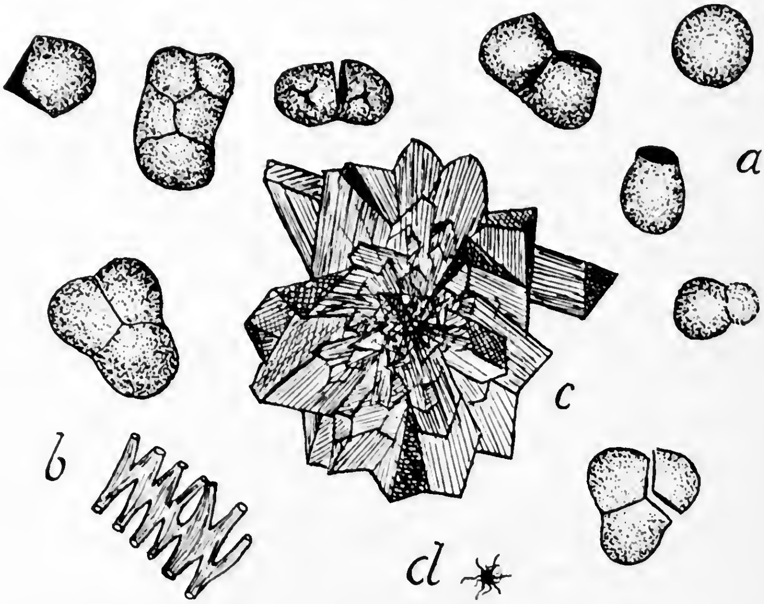

FIG. 6.—Rheum Rhaponticum. x 450 diameters. *a*, starch; *b*, fragments of pitted vessel; *c*, calcium oxalate; *d*, chrysophanic acid.

acter. Under the action of alkalis these differences in color become more manifest. Ammonium hydrate proved the most suitable reagent for this purpose. Under its influence Chinese rhubarb turns a dark, brick-red color, while the *rhaponticum* exhibits a distinctly salmon-red shade. Canaigre with the same reagent gives a brownish color. To apply the test, place upon a glass surface a small amount of powder, and moisten it with a drop or two of ordinary ammonia water. At once the color reaction becomes apparent. A mixture of the two rhubarbs cannot thus be detected, as the pink of the *rhaponticum* is masked by the stronger yellow of the Chinese variety. The

stronger alkalis did not afford satisfactory results, since they formed a gelatinous mass with the powders that did not show the colors well.

Briefly, then, the author's results indicate the following facts, viz: That the characteristic elements of the powdered rhubarb are the starch grains, calcium oxalate crystals, and massed acicular crystals of chrysophanic acid, and that these are so similar in the two forms that no point of distinction is offered by them. Also, that the reac-

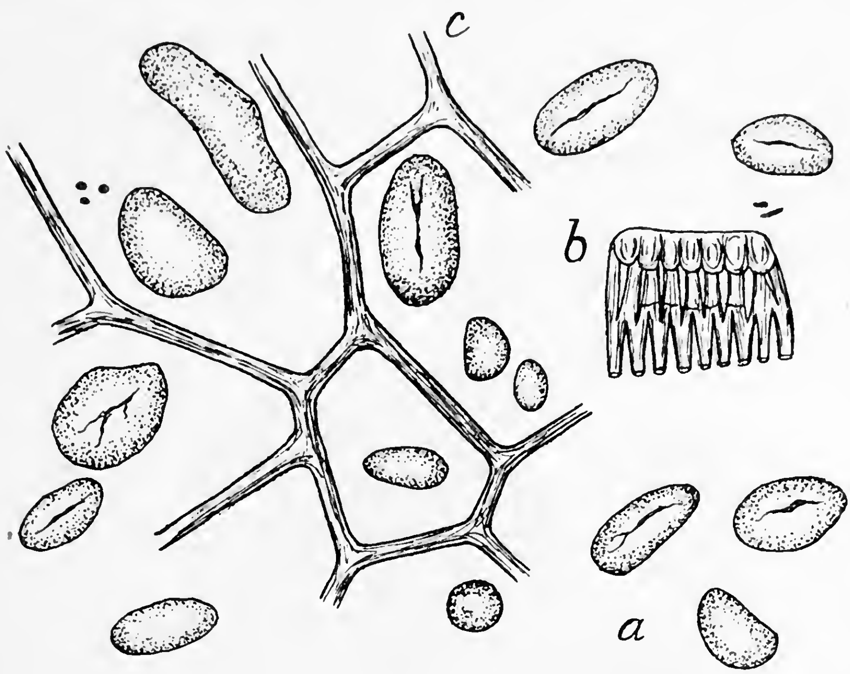

FIG. 7.—Rumex Hymenosepalus. x 450 diameters. *a*, starch; *b*, fragments of pitted vessel; *c*, parenchyma cells.

tion to ammonia serves as a means of identifying the pure specimens, but not mixtures. And, finally, that adulteration with canaigre may be detected by the presence of the characteristic long starch grains.

Before making any suggestions as to the manner in which the text of the U.S.P. describing rhubarb may be changed so that powdered rhubarb may be clearly identified, the author desires to make further study of the subject. He would gladly receive the co-operation in this work of any who are interested.

Selenium has recently been employed for producing colored glass. Rose-tinted glass is made by adding selenium directly to the ingredients in the melting-pot, the depth of tint depending on the quantity used and upon the character of the glass—whether hard or soft.

METHOD OF ANALYSIS OF LICORICE MASS.

BY ALFRED MELLOR.

At the December Pharmaceutical Meeting of the College, the question of a method for assaying licorice extract was raised. It was stated that very little on the subject had been published. The following process has been adopted by the large consumers and manufacturers in the United States.

(1) *Moisture.*—Expose about two grammes of the mass in a platinum or porcelain crucible in a water oven until hardened. Then divide the dry residue in small pieces with a penknife, heat again until constant weight.

(2) *Mineral Matter.*—Place the same crucible, with mass as above, over a Bunsen burner until the ashes are white.

(3) *Insoluble Substance.*—Dissolve 5 grammes of the mass in 100 c.c. of distilled water (100° C.) and decant, after twelve hours, the supernatant solution from the sediment through a dried and weighed filter, also collect sediment on same by using cold water in rinsing the beaker. A further sediment is noticed in the filtrate after another twelve hours' subsidence, because traces of starch unavoidably pass through the filter, which is treated as above and collected on a second filter. These two quantities shall be the insoluble substance.

(4) *Gummy Matter.*—Dissolve 5 grammes of the mass in a beaker with 50 c.c. of distilled water (100° C.). When completely dissolved, pour on 100 c.c. of alcohol (95 per cent.), and vigorously stir. Allow to subside over night, filter the precipitate on a dried and weighed filter, and wash the residue with a mixture of two parts alcohol (95 per cent.), and 1 part of water until the filtrate passes colorless. By drying the residue in a water oven and weighing, the combined percentages of insoluble substance and gummy matter are obtained. On deducting the percentage of the insoluble substance (No. 3) from this, the percentage of gummy matter is determined.

(5) *Glycyrrhizin.*—Concentrate the alcoholic filtrate from the foregoing residue (insoluble substance and gummy matter) to the volume of 30 c.c. and transfer to a tared beaker by using about 20 c.c. of water. Add 12 drops of sulphuric acid previously diluted with 5 c.c. of water, while stirring, to precipitate the glycyr-

rhizin, and set aside over night in a cool place. Pour off the liquid through a filter and wash the glycyrrhizin three times with ice-cold water by decanting. One drop of concentrated ammonia water is added to neutralize any acid remaining. The drying is carried out in a water oven to constant weight.

(6) *Saccharine Matter.*—The liquid decanted from the precipitated glycyrrhizin is neutralized with barium hydrate and the formed barium sulphate separated by filtration. The amount of saccharine matter in the filtrate is determined with Fehling's solution.

(7) *Extractive Substance.*—The balance which remains by addition of the percentages of water, mineral matter, insoluble substance, gummy matter, glycyrrhizin and saccharine matter, and subtracting from 100, will give the amount of extractive substance.

PHILADELPHIA, January, 1898.

DIASTATIC FUNGI AND THEIR UTILIZATION.

BY JOKICHI TAKAMINE.

Up to the present time the germination of cereals has been the only source of diastase of any practical importance known in America and Europe. It is true that there is diastase of animal origin, such as ptyalin and pancreatic diastase, but their sources are limited and their potency unstable. Therefore they are comparatively of less importance than the vegetable diastase, which has an inexhaustible supply of raw materials of uniform power. In Japan, and some other Asiatic countries, certain kinds of fungi are used in the production of diastase. The fungus that is in use in Japan is called *Moyashi,* which was named by Ahlburg Eurotium Oryzæ. It belongs to the genus Aspergillus, and is distinguished from ordinary fungus by its remarkable power of generating diastase during its growth. It is a perfectly harmless plant, as proven by the fact that it has been used in Japan for several centuries in the manufacture of the various daily beverages. The accompanying microphotograph shows the form of its beautiful growth. Further study has shown that a good many other fungi have, to a more or less degree, a similar property, and naturally, therefore, the selection of the species which has the strongest diastase generating power becomes of technical importance. This selection is determined by the culture,

multiplication of each species, preparation of diastatic substance and the comparison of the diastatic power of different species under similar conditions. Such selected species are then subjected to cultivation for the purpose of obtaining their matured spores in the production of diastatic substances. For this purpose suitable materials, such as rice, hominy, ground corn, or wheat bran, are thoroughly steamed so as to sterilize the mass, as well as to gelatinize the starch, and the

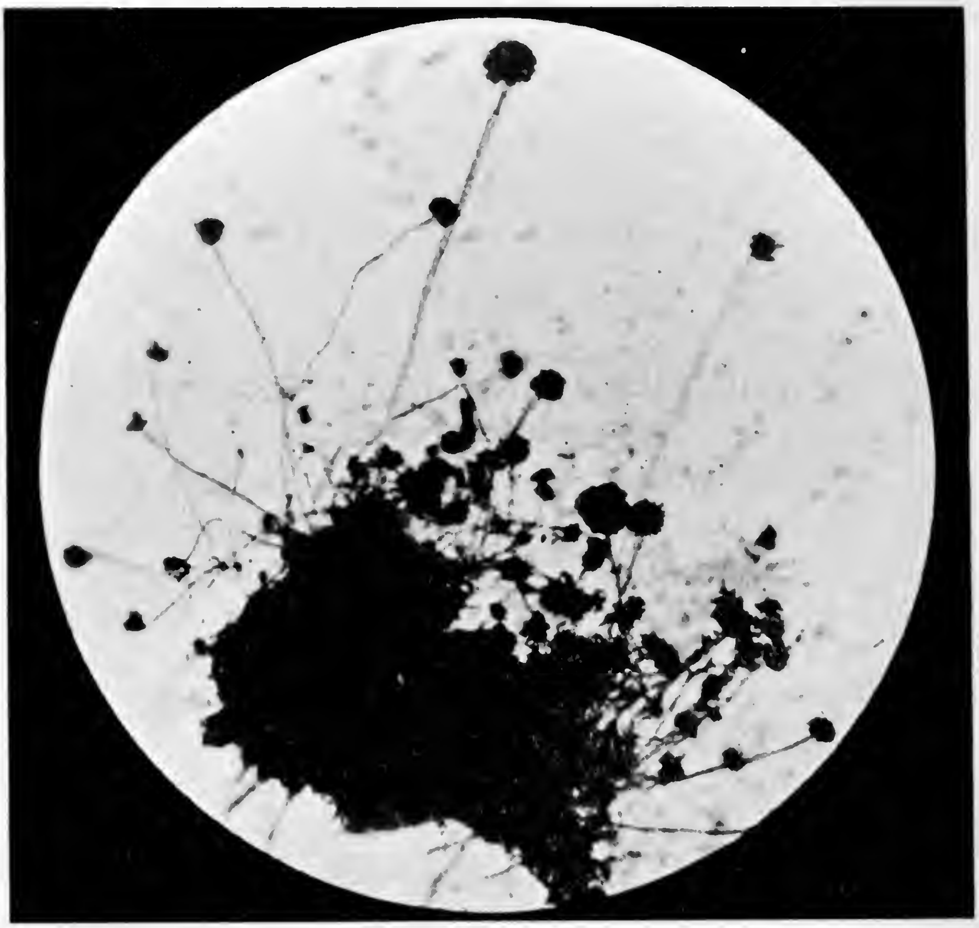

FIG. 1.—Taka-Moyashi.

product is supplied with an artificial fertilizer to give the plant the sufficient amount of nutriment for its complete maturity. On to this mass selected culture is sown, after which it is put into an incubator of proper temperature and humidity. Inside of twenty-four hours the fungus growth will become visible, and at the end of six or seven days the growth will reach its maturity, presenting a rich, velvety appearance of color, varying from reddish to dark green,

according to the species of plant used. This product is carefully dried and preserved. The matured spores of the plant may be separated from the mass by shaking, or sifting, and then can be preserved indefinitely. The product thus obtained is called Taka-Moyashi, and is used as the seed spore in the manufacture of diastatic substances.

To produce diastatic substances for commercial purposes, wheat

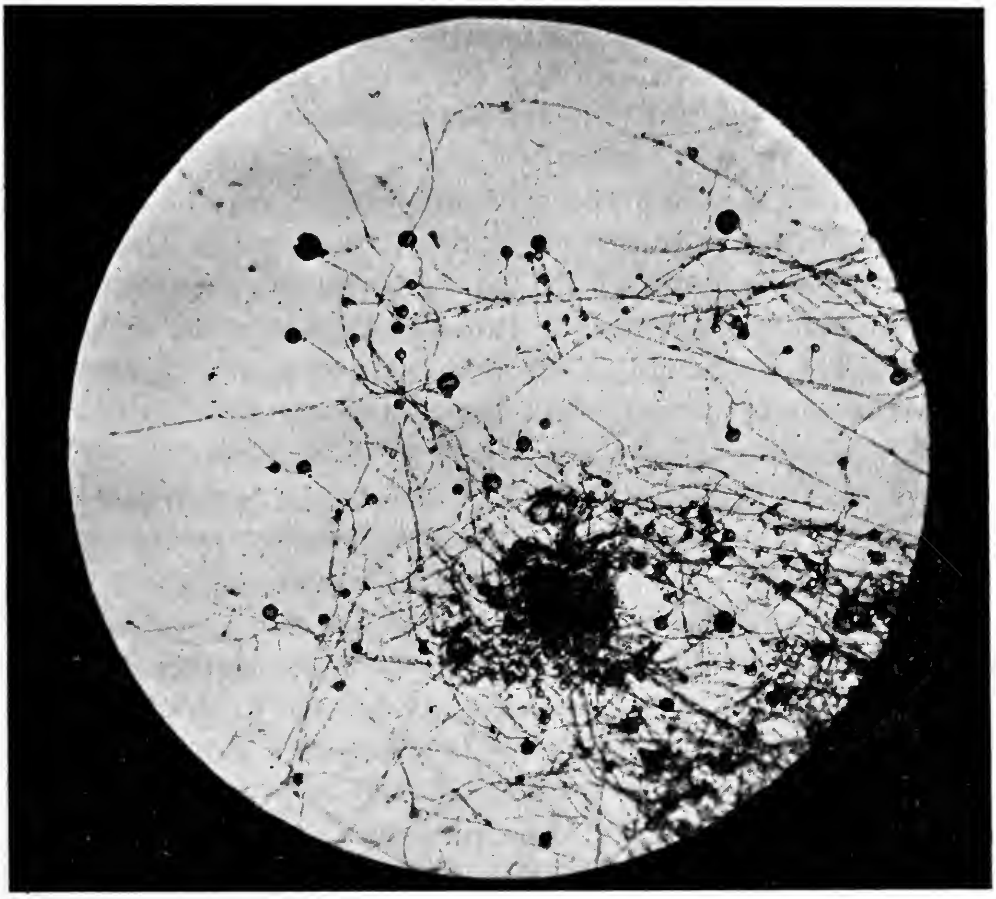

FIG. 2.—Black Fungus—Non-diastatic.

bran is first moistened with water and then thoroughly steamed. After the mass is cooled down below 40° C., a small quantity of Taka-Moyashi is added and thoroughly mixed. The mass is then taken into a growing-room similar to that of a malt-floor, and spread in a layer varying from one to two inches in thickness. The temperature of the room is kept at about 25° C., and the humidity at above 80 per cent. Inside of twenty-four hours the fungus shows its growth, and the diastatic strength of the mass will

steadily increase as the growth advances, and it will be found that within from forty to fifty hours the diastatic power reaches its maximum, after which the mass is taken out of the growing room and cooled down to ordinary temperature to check the further growth of the plant. The mass thus obtained is called Taka-Koji, and can be used as it is in the green state, or it can be dried for preservation. As the diastase generated in Taka-Koji is readily soluble in water, the mass may be percolated with cold water and the extract thus obtained can be used as a diastatic agent, or, for the same purpose, it may be mixed with the extract of ungerminated cereals, which have the singular property of augmenting the diastatic power of Taka-Koji.

This extract, for the purpose of preservation, may be evaporated under a vacuum to a thick, syrupy condition. In this condition its diastatic power is from eight to ten times stronger than that of malt extract of similar consistency. It can be applied to all such industries as the manufacture of alcohol, beer, vinegar, etc., where the diastase performs the important function of converting starch into sugars.

The aqueous extract of Taka-Koji can still be further purified by precipitating the diastatic principle of the extract by the addition of alcohol. For this purpose an extract containing about 20 per cent. of solid matter is mixed with four to five times its own volume of strong alcohol. By this means the diastase, together with some other albuminoids, is precipitated, while the sugars and other impurities remain in solution. The precipitate is now separated from the mother liquor by decantation and centrifugal force; it is then pressed and air-dried. The product thus obtained is called Taka-Diastase. It is a yellowish-white odorless powder, possessing a nutty taste. It is readily soluble in water, yet it is non-hygroscopic. It is perfectly stable in its diastatic power. It converts in ten minutes over 100 times its own weight of starch, according to the modified Junk's test. It has remarkable starch-liquifying property besides starch-saccharifying property, the former being three or four times stronger than that of purified malt. It is strong enough for all practical purposes. It can be, however, further purified to wonderful strength by re-precipitation or otherwise.

The applications of Taka-Diastase are varied and extensive. From the remarkable stability of its diastatic power it can be used

as a standard of comparison in the determination of the diastatic power of other substances. Its use as a remedy for amylaceous dyspepsia is of no mean importance.

Considering the fact that more than two-thirds of our food consists of starch substances, such as potato, bread, pudding, etc., and also that the diastase of the saliva has to perform the principal function in the digestion of starchy food, and that the saliva is subjected to various causes of loss and deterioration of its diastatic power from various causes, such as smoking, drinking, chewing and rapid eating, it is not to be wondered at that two-thirds of the dyspepsia is of a starchy origin, and therefore it is apparent that some kind of strong diastatic substance is required to supply the deficiency of the diastatic power in the system of the digestive organs.

While our knowledge is very limited of the quantitative estimation of the diastase daily generated, and contained in the saliva and pancreatic juices, as far as my investigation goes the quantity of diastase secreted in the saliva daily is very considerable. It amounts to from 5 to 8 grammes of Taka-Diastase, or about ½ pound of the best malt extract. While investigation in the way of the production of diastase from a fungus growth is still in its infancy, yet that which we already know on this subject seems to indicate that this has opened an entirely new field for the economic production of diastatic ferments. I firmly believe that this field will, in the future, supersede in every respect the old known source, namely, the germination of cereals.

A SIMPLE AND ACCURATE METHOD OF TESTING DIASTATIC SUBSTANCES.

By Jokichi Takamine.

There are various methods known for determining the diastatic power of substances, as Lintner's, Junk's, and others. While some of these are very reliable in many respects they are complicated, and require specially trained hands to get reliable results. They are not, therefore, applicable when quick, simple and accurate testing is desired, as in diagnosing a certain form of amylolitic dyspepsia by determining the diastatic power of the patient's saliva. My pro-

posed test method is based upon the stable diastatic property of Taka-Diastase.

So far as is generally known, and it is also my own experience, that the diastase isolated from malt, and that precipitated principle of saliva known as ptyaline, lose their diastatic power by standing. Therefore, when the diastatic power of any substance is to be determined, it is necessary, if they are used, to go through the long process each time of determining the quantity of sugars formed by their action on starch (Lintner's method), or else measure the length of time required to convert the given quantity of starch into sugar (Junk's method). While these processes have valuable merits of their own, yet they have the disadvantage of being rather complicated for quick, everyday work. In carrying out my proposed method, a quantity of Taka-Diastase is tested by either of the abovementioned processes (Lintner's or Junk's[1]), and its exact diastatic power determined once for all. The diastatic power may be expressed as, say, 300 Lintner's units, or it may be expressed as converting 100 times its own weight of dry starch into sugar in ten minutes.

The diastatic power of any substance under examination is now compared with the standardized sample, and expressed in any terms desired, either directly or by simple calculation. It is highly desirable that one standard should be adopted, and, whatever that may be, the following comparative test will be found useful. First prepare the following solutions:

(*1*) *Standard Taka-Diastase Solution.*—Dissolve 1 gramme of standarized Taka-Diastase solution in 100 c.c. of water; this solution ought to be made fresh each day.

(*2*) *Starch Solution.*—Make a 5 per cent. solution of neutral potato starch by boiling 800 c.c. of distilled water in a suitable wide mouth vessel; pour into it milk of starch, made by stirring 50 grammes of starch into 200 c.c. of cold water, and boil two minutes.

(3) *Iodine Solution.*—Place 1 gramme of iodine and 2 grammes of potassium iodide in a flask, add a little water, say 5 c.c., agitate until dissolved and dilute to 120 c.c.; or dilute 50 c.c. tincture of iodine, U.S.P., with 50 c.c. of water, containing 2·5 grammes of potassium iodide.

Apparatus Required.—(1) One quart agate-ware kettle; (2) one

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[1] Lintner, *Jour. für prak. Chem.*, [2] 34, 378–394. Junk, *Am. Jour. Phar.*, 55, 289 and 57, 13; modified in *Bulletin of Pharmacy*, February, 1898, page 52.

shallow tin pan, 2 inches deep, 8 inches in diameter; (3) two 1 c.c. pipettes graduated to tenths; (4) eight large glasses or tumblers of about 150 c.c. capacity each; (5) ten small test tubes; (6) one 100 c.c. cylinder; (7) two white dinner plates.

Process of Testing.—Pour into each of the eight glasses 100 c.c. of the hot starch paste. Place them side by side in the shallow pan of warm water at about 40° C. Measure into the first glass 1 c.c. of the saliva or other liquid to be tested. Pour, of the standard diastase solution, in quick succession:

Into the second glass	1 c.c.
Into the third glass	2 c.c.
Into the fourth glass	3 c.c.
Into the fifth glass	4 c.c.
Into the sixth glass	5 c.c.
Into the seventh glass	6 c.c.
Into the eighth glass	7 c.c.

Then the contents of each glass is stirred with the test tube as a stirring rod in quick succession, until the starch paste all becomes limpid. At this stage it will be observed that the stronger the diastatic power the quicker the liquefaction of the paste. When the contents of the glasses become liquefied, take out of each glass in succession a drop of the liquid by means of the stirring test tube, and drop on a white, dry dinner plate in the order of the glasses. When there are eight drops of equal size on the plate, drop on each one drop of the iodine solution. Then spread each sample with the finger to about the size of a silver dollar. The drops from the second to the eighth glass will form a colorometric scale from blue to purple and reddish-brown. Observe now which member of the scale corresponds to the color of the one containing the saliva. The comparison is made more certain by repeating the tests within the first ten minutes after the saliva is put in.

Suppose the color corresponds to somewhere between the fourth and fifth, then we can assume it at 4·5, and calculate the diastatic strength in terms of starch converted or sugar formed; or, if further accuracy of the test is desired, a scale of starch glasses containing standard diastase solution of 4 c.c., 4·2 c.c., 4·4 c.c., 4·6 c.c., 4·8 c.c., and 5 c.c., may be put up and compared with 1 c.c. of the given saliva in the same manner.

Instead of having only one specimen at a time, several samples of saliva or other diastatic substances can be tested at once.

ASARUM CANADENSE, L.[1]

By Henry Kraemer.

The work of the Systematist, with both Phænogamous and Cryptogamous plants, is affecting all departments of Botany, and therefore also the pharmacist and physician who have to deal with their healing properties. When we consider that the chemist has made several hundred new remedial compounds or preparations, we may expect that the botanist will also add, to some extent, to our materia medica. The chemist can apparently easily enough add to or take away from a compound a radical or radicals, or rearrange the whole and obtain something that is very different from what he started, and to which he may give a new name. But the botanist is dealing with things that possess a vital force—and, consequently, is at a disadvantage, very frequently, to say, without long and careful researches, whether he has something new or not. If he goes to an unexplored realm, he expects to find undescribed plants. Some, however, prove to be merely forms, others are distinct species. This latter distinction, however, it must be said, cannot have been proven until from the seed similar forms of plants are produced.

In more recent years the familiar plants around us have become more carefully studied. Students are studying them as they occur in the field from year to year. All are beginning to recognize that each individual shows some characteristics of its parents, but that, under peculiarities of environment, they manifest a tendency to variation. It is not surprising, therefore, that forms occur that seem quite distinct from the parent. Whether they are so can only be proven by observing the development from the seed to seed. If this apparent dissimilarity continues in the offspring as an inherent and hereditary quality, then we have, by reason of the law of variation, first a variety, and finally a distinct species. Until such tests have been made, it seems that a new species has not been proven to exist. What the various reactions and combustions are to the chemist, this life history, as perpetuated in the plant from the parent to the seed and subsequent offspring, is to the scientific, systematic botanist.

[1] Thanks are due the editor of the Torrey Botanical Club *Bulletin* for the loan of electrotypes of Eugene P. Bicknell's paper in the November, 1897, issue of that journal.

Everyone who has had anything to do with the study of plants in their environment has observed remarkable differences in them depending upon the conditions of soil (both physical and chemical), atmosphere, light, etc.; and when the plants are removed from these conditions and placed under similar influences to a similar degree, that these differences not infrequently disappear, and we

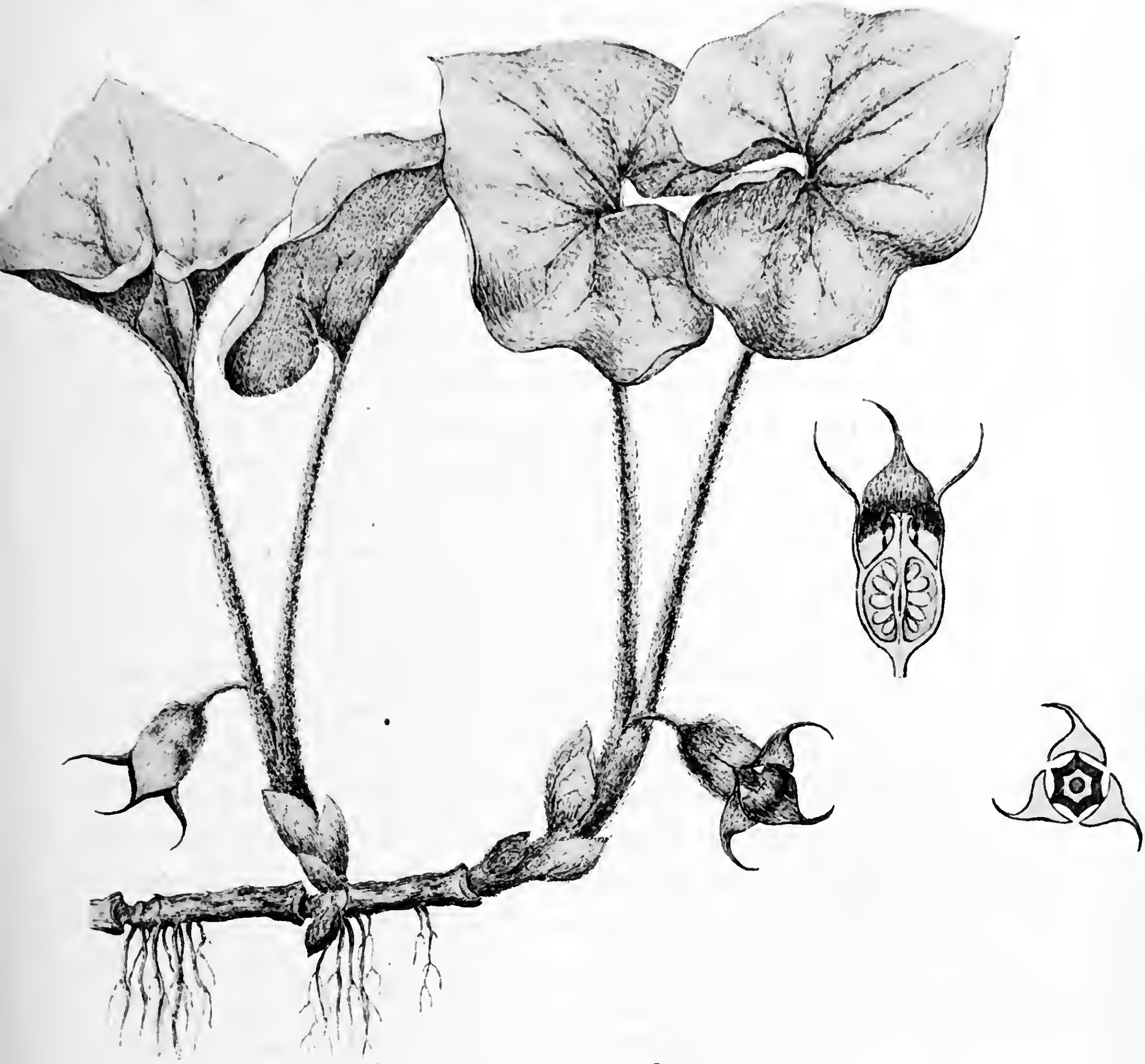

FIG. 1.—Asarum Canadense, L.

have become better acquainted with the origin of the forms so different.

The discovery of an additional species, in an old species of medicinal plants, has been made recently by Eugene P. Bicknell. In an article[1] on "A new species of wild ginger hitherto confounded with

[1] *Bulletin of the Torrey Botanical Club*, November, 1897, p. 528.

Asarum Canadense, L." he says: "It has certainly much significance in its bearings on the study of our common flora that a plant so noteworthy as the familiar wild ginger, and supposedly so well understood, should now reveal itself as embracing two perfectly distinct species. Both plants are common and widely distributed, but they are so much alike in general appearance that it is scarcely a matter of surprise that they have held their secret so long. Agreeing in main features throughout, they share the same general form of rootstock, leaf and flower, are similar in habit of growth, and bloom at the same time. The differences between them are, in fact, no greater than might fairly measure the variation of a single species, and that they are of higher import has been learned only by careful field-study continued through several seasons. While the determination of dried specimens is not always easy, living plants may always be distinguished instantly by a glance at the flowers, and further comparative study cannot fail to lead to their recognition as beautifully similar, yet beautifully distinct species."

"The most obvious differences between these plants reside in the flowers. In the one, the calyx-lobes are spreading and revolute, passing gradually into a slender, upcurved acumination, and the interior of the tube is purple nearly down to the base; in the other species the calyx-tube is white within and the flat and reflexed lobes are abruptly acuminate at the apex into a straight obtuse point."

The new species Mr. Bicknell calls *A. reflexum*, and in order to readily see the distinction between this and *A. Canadense*, I have arranged the elements of the two, with their characteristics, as given by Mr. Bicknell in the following manner:

Asarum Canadense, L.	*Asarum reflexum* (*n. sp. Bicknell*).
(1) Roots numerous, mostly clustered at the lower ends of the internodes, often densely matted together.	(1) Roots fewer and more slender than in *Canadense*, more scattered, or borne mainly at the forward ends of the internodes.
(2) Rootstock short, stout, 2·5–15 cm. long, 6–10 mm. thick.	(2) Rootstock slender and elongated, 1·0–4·5 dm. long, about 4 mm. thick.
(3) Internodes 1·5–4·0 cm. long, puberulent, narrowly scarred from the insertion of the pollen bracts.	(3) Internodes 4–10 cm. long, glabrous, bract scars prominent, the uppermost distant.
(4) Constricted at the nodes.	(4) Little, if at all, constricted at the joints.

(5) Bracts broadly ovate, obtuse, more or less puberulent, approximate or overlapping, finally loosely spreading and deciduous.

(6) Leaves, commonly reniform-cordate, little, if at all, broader than long, with a deep, often partly closed sinus, acute or obtuse at the apex, rugose veiny, the hirsutulous-puberulent upper surface with a satiny lustre, the lower surface somewhat shining beneath the close pubesence of minute white hairs.

(7) Leaves at first 4–7 cm. broad on petioles, 2·5–5 cm. long, later becoming much larger, and reaching an extreme size of 21 cm. wide by 19 cm. long, on petioles 32 cm. in length.

(8) Petioles 3–6 mm. thick, at first canescent throughout, or densely white pubescent, with short, spreading, or slightly reflexed hairs, becoming more loosely pubescent or puberulent, often with cinereous or somewhat rusty hairs.

(9) Flowers at anthesis usually reclining on the ground on short, spreading or declined peduncles, at maturity often erect or raised on ascending or erect peduncles 13–40 mm. long.

(10) Freshly opened flower about 1·3 cm. long, the tube of the calyx about twice the length of the ovary, when fully grown, often 2·5 cm. long and 12–15 mm. wide, the ovary and tube of about equal length.

(11) Upper half of the erect calyx-lobes spreading or ascending, somewhat crescentic in outline, with revolute margins which pass into an upcurved tubular acumination 4–8 mm. long; spread of the flowers across the acuminate lobes 2–3·8 cm., the opening of the tube circular.

(5) Bracts narrower and more acute than in *Canadense*, less pubescent, more or less separated or distant, early spreading and deciduous.

(6) Leaves varying from reniform and lunate-reniform, with a shallow open sinus to suborticular with a deep sinus obtusely pointed, broadly acute or rounded at the apex, darker green, thinner and less rugose than in *Canadense*, commonly nearly glabrous above and with a satiny lustre, somewhat shining on the lower surface through the thin or sometimes close pubesence of minute hairs.

(7) Leaves commonly 10 cm. wide by 8 cm. or less long, on petioles 1.5 dm. long, an extreme size, 1.7 dm. wide, on petioles 2 dm. long; at vernation the petioles are relatively longer than in *Canadense*.

(8) Petioles slender, 3–4 mm. thick, loosely or thinly tortuose-pubescent, with slightly longer and softer hairs than in *Canadense*, somewhat shining on the outer surface, and mostly glabrous towards base, except along the villous-pubescent inner margins, often nearly glabrous throughout in age.

(9) Flowers at anthesis on slender ascending or erect peduncles, at maturity mostly spreading or reclined on peduncles 3·8–5 cm. long.

(10) Flowers smaller than those of *Canadense*, 8–20 mm. long, 7–14 mm. wide, spreading 16–26 mm. across the extended lobes, the tube 4–8 mm. high; the ovary from the first about the length of the calyx-tube.

(11) The limb early reflexed, in age sometimes ascending, the lobes 8–10 mm. long, about the length of the tube, flattish and rather brittle, triangular in outline, ending abruptly in a straight obtuse point 2–4 mm. long; opening of the flower commonly more or less triangular.

(12) Rudimentary petals almost always present as filiform bodies 2–4 mm. long, rising from the surface of the ovary opposite the sinuses of the calyx.

(13) Peduncles and calyx villous-pubescent or in age nearly canescent, the spreading purple segments densely erect—puberulent with thickish purple hairs, or sometimes greenish and nearly glabrous, probably through abrasion; inflexed tips of the calyx-lobes in the bud coherent and extending down to the tip of the column; exterior of the calyx hexagonal, the six faces plane, dull whitish to greenish purple, the interior of the tube deep purple more than half-way down to the white base, which surrounds a hexagonal purple band enclosing the stamens.

(14) Surface of ovary at maturity somewhat pyramidal, rising into the short, thick terete column, which is 2–4 mm. high and rather deeply six-lobed at the summit; stigmas prominent, at anthesis pale-pink and densely spiculate.

(15) Stamens dull pinkish-purple, anthers dull pink; prolonged tips of the filaments slender-subulate, from one to three times the length of the anther in the long series of stamens. (*Fig. 1.*)

(16) Habitat: From Quebec and Ontario to Western Massachusetts, Southeastern New York and Pennsylvania and southward in the Alleghanies to Virginia. In rich, hilly woods, often in rocky situations.

(12) Rudimentary petals usually wanting.

(13) Peduncle and calyx densely cottony-villose, much less so in age, the outer surface of the sepals loosely pilose-pubescent, the reflected brownish purple segments somewhat shining and minutely puberulent, with dull purple hairs and faintly parallel-veined; inflexed tips of the sepals in the mature bud extending only half-way to tip of column; interior of the tube white or greenish-white below the rim, the disk surrounded by a purple band, as in *Canadense;* exterior of flower white to greenish purple, the hexagonal base with prominent rounded angles and intervening depressions.

(14) Surface of ovary plane or nearly so; column slender, columnar, longer than in *Canadense*, 4–7 mm. long, strongly grooved to receive the longer series of stamens, the stigmas greenish and purple, rather smaller than in *Canadense*, and often merely granulose.

(15) Stamens deeper purple than in Canadense, with shorter anthers, the filaments slightly longer and closer to the column, their tips shorter and less attenuate, often less than half the length of the anther. (*Fig. 2.*)

(16) Habitat: Southeastern New York, and doubtless Connecticut, to Iowa, south to the mountains of North Carolina, Missouri and Kansas. Rich, low woods along streams or river, valleys, often forming extensive beds; more rarely in upland woods; flowering at the same time as *A. Canadense.*

Mr. Bicknell further says, regarding *A. reflexum*, that "it would appear that a geographical variety must also be recognized. Living specimens were sent to me in May, 1897, collected on the bank of the Desplaines river at Maywood, Ill., near Chicago, which, though essentially like the type, show characters apparently never developed

by the more eastern plant. As in the case of *A. reflexum* and *A. Canadense*, here again the most evident differences are found in the flower, which shows especially a notable elongation of the strongly-

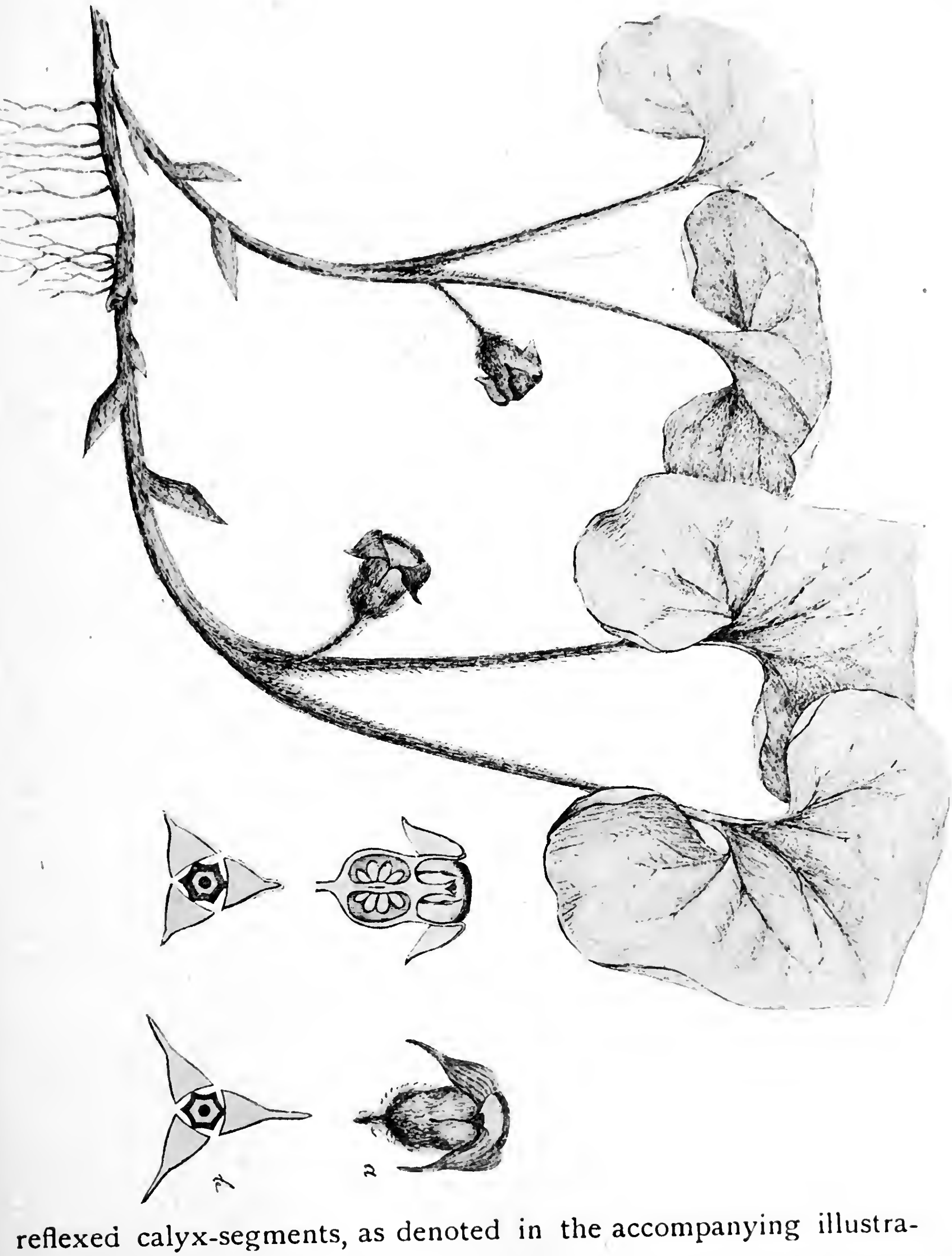

FIG. 2.—Asarum reflexum, Bicknell.

reflexed calyx-segments, as denoted in the accompanying illustration (*Fig. 2, a, b*)."

The late Prof. E. S. Bastin has given the readers of the *Amer. Jour.*

Pharm. (December, 1894, p. 574) a careful description and drawing of the *Asarum Canadense*, L. (*Fig. 3*), that he studied, together with the inner morphology of the rhizome and roots. The drawing is reproduced at this time on account of the interest attached to Mr. Bicknell's studies. In his description of *A. Canadense*, L., Professor Bastin says, among other things, that the leaves are "broadly reniform, entire-margined and slightly but distinctly pointed at the apex. They attain a transverse diameter of from 10 to 12 cm., are deep-green and silky-lustrous by reason of a minute pubescence on the upper surface, and are lighter colored and prominently veiny below."

"From between the two leaf-bases issues a single pedunculate, nodding, dull-purple flower, which, together with the peduncle, is densely covered on the outside with a woolly pubescence. The calyx is rather fleshy, with its tube adnate to the ovary, and a three-parted limb, the segments of which, in the bud, have their tips inflexed, but which, when the flower is in full bloom, are wholly recurved. The corolla in this, as in all other species of the Aristolochiaceæ, is wanting."

We naturally expect that a plant with such aromatic properties would be described in almost all of the medical botanies. We find in Barton's Botany (p. 87) a colored illustration of what he calls *A. Canadense.* He says: "The calyx is very woolly, and is divided into three broad, concave, acuminate segments, with the point reflexed. They are of a deep-brown purple color on the inside, and of a dull-purple, inclining to blue-green, externally."

Bigelow, in his Medical Botany (Vol. I, p. 151), says: "Calyx—very hairy or woolly, consists of three broad concave leaflets, which are mostly of a brownish or dull-purple on the inside at top and bottom, and terminated by a long, spreading, inflected point, with reflexed sides. The color varies greatly, according to the amount of light which the plant enjoys."

Eaton (Botany of North America, p. 173) describes *Asarum Canadense* to have "the calyx woolly, deeply three-parted; divisions sublanceolate, reflected."

Wood (Class Book of Botany, p. 601) says under *Asarum Canadense*, L., "calyx woolly, deeply 3-cleft, the segm. reflected." * * * "Color purplish, of 3 broad, long-pointed divisions abruptly spreading."

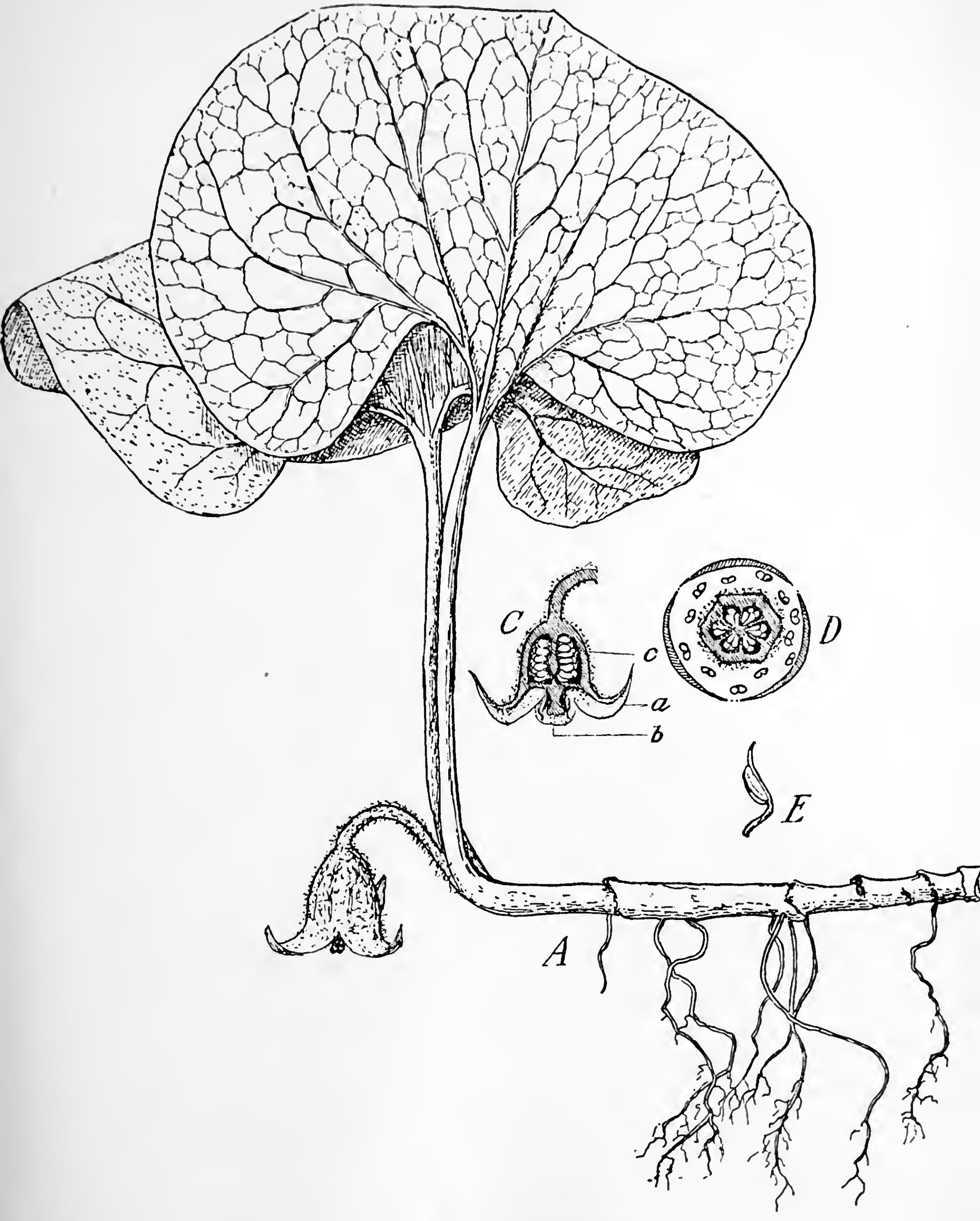

FIG. 3.—Asarum Canadense, L.

In Elliott's Botany (vol. I, p. 531) we learn that *A. Canadense*, has the calyx woolly, deeply 3-parted, segments nearly lanceolate, reflected."

From these citations we might be inclined to think that the *A. Canadense* described by writers of medical botany has been really *A. reflexum*. According to Bicknell, "Rafinesque really knew both of our plants, but made the mistake of renaming true *Canadense*, assuming that to be the one which was undescribed." As to what plant yields the "wild ginger" of medicine, whether *A. Canadense*, or *A. reflexum*, and as to whether any change ought to be made in our present nomenlature, further investigations are necessary. According to Britton and Brown (*Flora of Northern United States and Canada*), *A. Canadense*, L., perhaps includes two species.

That the medical and pharmaceutical professions ought to be slow to adopt new names is evidenced by the fact that scientific systematic botany cannot be made until all of the returns are in from the various departments of botany, including inner as well as outer morphology, biology and ecology. Consequently the names by which we have recognized plants ought to be held as the safest means of carrying on the work of the two professions, so that little friction and misunderstanding may occur.

AN EXUDATION FROM LARIX OCCIDENTALIS.

By Henry Trimble.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 174.

Resinous exudations from conifers are very common, but there are a few instances where the secretion resembles in physical properties the carbohydrates. One of the most notable of these is that from the Pinus Lambertiana or sugar pine of California, and known as pinite. Another exudation is that from Larix Europæa, and known as Briançon Manna. Berthelot determined this to consist chiefly of a sugar which he termed melezitose. Recently I received from Prof. C. S. Sargent, of Harvard University, a small specimen of a sweetish substance collected by him from the Larix occidentalis on the upper Columbia river in British Columbia. He stated that it is used to some extent as a food by the Indians. It

was of a brownish-yellow color, somewhat porous, and possessed only a moderately sweet taste with a terebinthinous flavor. It was freely soluble in water on warming. The resulting solution was neutral to litmus paper, reduced Fehling's solution, and darkened on heating with sodium hydrate. The product from heating with the latter when supersaturated with nitric acid gave an odor of caramel, which pointed to the presence of some dextrose. On heating a weighed portion of the sample, after solution in water and filtration from the adhering particles of bark, with Fehling's solution, 19·38 per cent. of a reducing sugar were obtained.

Another portion similarly prepared and heated with dilute acid, and then, after making alkaline, with sodium hydrate, treated with Fehling's solution gave a total sugar value of 88·07 per cent, indicating 68·69 per cent. of non-reducing sugar or similar substance.

Treatment of a moderately strong aqueous solution with three or four times its volume of alcohol caused an abundant precipitate, which indicated that the non-reducing portion was precipitated, while the reducing portion remained in solution; the respective weights of these two portions, obtained by alcohol, confirmed the foregoing by Fehling's solution. The following will summarize the composition of the specimen:

	Per Cent.
Reducing sugar	19·38
Non-reducing sugar	68·69
Moisture at 100° C.	5·02
Ash	0·44
Wood fibre, etc., removed by filtration	6·47
	100·00

The reducing sugars had many of the properties of dextrose, but gave only a slight precipitate with phenylhydrazin. The non-reducing portion closely resembled dextrin. There was not enough of the sample to make a complete study of these two substances. I naturally inferred on commencing this investigation that this substance would closely resemble the Briançon Manna and consist of melezitose, but the absence of a very sweet taste and a number of other properties showed it to be entirely different from that substance. The portion soluble in alcohol yielded only traces of an osazone with phenylhydrazin, but the major part of the original substance was not precipitated by that reagent.

TRUE AND FALSE CACTUS GRANDIFLORUS.[1]

BY GORDON SHARP, M.D.

EXPLANATORY.

In the end of 1891 my attention was directed to the night-blooming Cereus, a so-called heart tonic, the correct botanical name of which is Cereus grandiflorus, Miller, although it is commonly known as Cactus grandiflorus, Linné. I made several bedside observations with a tincture which has a greenish color. Sometimes I thought I had obtained good results; at other times I had difficulty in deciding whether the preparation had any virtue at all. This, however, is not unusual in treating of disease, especially heart disorders. But between these conflicting opinions I resolved to place the drug on further trial. In time the supply of tincture ran down and another was ordered, but when it came to hand I was astonished to find that, although like the former, it had a pleasant orris-like odor, the color was different, being of a yellowish-brown hue. The pharmacist from whom it was obtained made inquiry, and was told it was quite right, and was the genuine drug, and no further questions were asked. My bedside observations were continued, and sometimes I had a greenish and sometimes a brownish tincture or liquid extract, but oftener the latter. After several further trials I decided to make my own tincture, and with this purpose in view I got a pharmacist to procure me the dried flowering tops, and this he did from a Manchester house. Mr. J. H. Hoseason at this time joined me in investigating the chemistry of the drug, and either jointly or alone we had an agent to obtain supplies from Manchester, Leeds, London, and Edinburgh houses. In one way or other we employed many pounds weight of the drug, and each parcel was certified to be the true Cactus. For reasons which will be obvious later on, I have made particular mention of these facts. We had previously searched the literature of the subject from every possible source, but could find no mention of any analysis of the drug. We resolved to start at the beginning, and I think I may be pardoned when I say we expended endless labor in our task. Our results have been partially recorded in the *Practitioner* of September, 1894, and in the *Pharmaceutical Journal* of November 24, 1894. But the chemistry is the

[1] *Pharmaceutical Journal*, December 18, 1897.

chemistry of Opuntia decumana, Haworth, not of Cereus (Cactus) grandiflorus, Miller. We owe the unearthing of this blunder to the learned Curator of the Pharmaceutical Society's Museum in London, Mr. E. M. Holmes. Mr. Holmes investigated this subject last summer, and communicated with me, and I sent him a specimen of the drug we had worked with, and at once the fallacy was discovered. He has written an article on the subject of Cereus and Opuntia in the *Pharmaceutical Journal* of August 21, 1897. The pharmacology of my article in the number of the *Practitioner* already quoted is really the the pharmacology of Opuntia, not of Cereus.

The question of therapeutical action does not concern a company of pharmacists, but it is almost necessary for me to refer shortly to this aspect of the subject. The therapeutic observations were made from specimens of both Cereus and Opuntia, and also from pills prepared from the formula of Mr. T. W. Sultan. Each pill contains $\frac{1}{100}$ grain of extract of genuine Cereus. Mr. Sultan does not say in his pamphlet whether this preparation is an alkaloid, or a resin, or a glucoside; he merely calls it the active principle. After all, then, my practical results are not much affected, if affected at all, by my pharmacological and botanical blunders. I am not alone in my experience, for I have had sent me from various sources samples of tincture, labelled Cactus grandiflorus, but which were preparations of Opuntia, and yet medical men had assured the senders that they possessed the virtues ascribed to the genuine drug. Since the publication of my article in the *Practitioner* I have had opportunities of carefully testing genuine Cereus alongside strophanthus and our old friend foxglove, and I have come to the conclusion that Cactus, whether genuine or spurious, is worthless, and should be discarded by both pharmacist and physician. Why should Opuntia have been so widely sold for Cereus?

From the fact that we obtained spurious specimens from so many sources, we must conclude that Opuntia has been widely distributed. On first consideration we are strongly tempted to blame the drug merchants for imposing a spurious drug on the buyer. I do not share this view. I believe the mistake arises largely owing to the carelessness of botanists in often calling Cereus by the name Cactus. I do not know whether Opuntia vulgaris, Miller, is another name for Opuntia decumana, Haworth, but I do know that Opuntia vulgaris is also known as Cactus opuntia, Linné. Here, then, may be

an explanation of the whole difficulty. The generic name Cactus having once got afloat, merchants, pharmacists and medical men have concluded there could be but one Cactus.

CHEMISTRY OF CEREUS AND OPUNTIA.

Cereus.—In Mr. Holmes' article in the JOURNAL, he tells us that Bonnett and Bay-Tessier discovered an alkaloid which they named cactine. Mr. E. H. Farr examined the drug in quantity, and found, among other substances, "glucosidal resinous bodies," and "also an alkaloid which is present in very small quantities only." The alkaloid must be present in very small proportions, for I failed to get any reaction with Thresh's reagent with three fluid drachms of a one in one extract. I do not like the name "glucosidal resinous bodies," which Mr. Farr employs, and I hardly appreciate the meaning of the term, but I am, perhaps, as worthy of blame myself, for I find that I suggested that resins might play the part of glucosides. Of one thing I am certain, and it is that some resins do reduce weak Fehling's solution when allowed to stand for an hour or less at the temperature of a water-bath. Cereus stems contain a large proportion of chlorophyll, and to this the extracts and tinctures of the genuine drug owe their beautiful green color.

Opuntia.—Still referring to Mr. Holmes' essay, Mr. Farr says: "On working on a quantity I did get an indistinct reaction for alkaloids and also a very slight reduction with Fehling's solution." Further, referring to the resins, Mr. Farr adds: "The most characteristic one is but very slightly soluble in aqueous solutions, and gives, with ammonia, a deep-yellow color. This one, with at least two of the other resins, reduces Fehling's solution on boiling, and to a fair extent." The experience of Mr. Farr with regard to the resins of Opuntia agrees in many points with that of Mr. Hoseason and myself, but we found no alkaloid, and we worked on large quantities and made a large number of trials. However, a significant point is that Mr. Farr only got an "indistinct reaction for alkaloids." The flowering tops and stems of Opuntia contain a pigment which I imagine is xanthophyll, and hence the alcoholic tinctures and extracts of the drug have always a yellowish or light-brownish color.

How came Cereus to be employed as a heart tonic? In view of the somewhat dogmatic opinion I have expressed of the worthless-

ness of Cereus and Opuntia, one must ask how the drugs came to have tonic properties? Before answering this query, we have to pause and ask ourselves how we have acquired our knowledge of many of our most valuable drugs. We civilized races, who have an intimate acquaintance with the sciences upon which is built the rational treatment of disease, have to acknowledge that to savage tribes or unlettered peoples belongs the credit of bringing under our notice the action of valuable drugs. Only to name one—sacred bark. The Spanish settlers of the Pacific Coast employed this agent long before it was known to us, and those Spanish settlers, we can hardly doubt, got their information from the original occupiers of the soil. In like manner, Cereus grandiflorus has been long employed by the West India Islanders in dropsy. Opuntia is also employed, in the form of a decoction, as a demulcent drink.

Both drugs contain a certain amount of resins and pectin (or a similar agent), and these substances have a stimulant action on the kidneys, and would, of course, be useful in dropsies. Now, many dropsies, if not most, have their origin in heart affections. The transition from the treatment of dropsy to the treatment of heart affections is an easy one. But then these peoples employ decoctions in which a large proportion of pectin is present. We employ alcoholic tinctures or extracts in which practically no pectin is present. Besides, these resins and pectins have no action on the heart itself. It must not be inferred from this that I advocate decoctions of Cereus and Opuntia. Although useful in dropsies, they are no more efficacious than the demulcent drinks known to us, such as barley water, gruels, and others, which we are in the habit of employing as aids in the treatment of dropsies. They are aids, nothing more. We use what lies to our hand, and the West India Islanders do the same.

I have so many people to thank for help in my work on these drugs that I hardly know where to begin; but I must not forget to mention Mr. J. H. Hoseason, late Lecturer on Pharmacy in the Owens College; Mr. E. M. Holmes; Messrs. Parke, Davis & Co.; Burroughs, Wellcome & Co.; Evans, Gadd & Co.; Wyatt (Lancaster), and others.

The *chrome-ore* industry in California, which for many years has been the only domestic source of supply, became practically defunct in 1897. The total production of the State is estimated at 50 tons, and the general opinion is that the industry has no future.

GLEANINGS FROM THE MEDICAL JOURNALS.

BY CLEMENT B. LOWE, M.D.

EXPERENTIA FALLAX.

Under the above title a very interesting article by H. D. Didama, M.D., is published in the *Philad. Med. Jour.*, January 15, 1898. The author rapidly and forcibly sketches the rise and reign of bleeding as an almost universal remedy. In speaking of the sway which it exercised over the most eminent practitioners of the age he says: "The truth is, these eminent men had never tested—never dared to test—any other form of treatment. They had walked so long in the good old road that their honest inertia could only be overcome by the "brute force," as Virchow expresses it, of indisputable facts ascertained by repeated control-experiments. These facts having been furnished and submitted to a successful cross-examination, the gyves of the venerated experience were broken, and the illustrious captives frankly abandoned their prejudice, sheathed their lancets, and led their disciples into the new and bloodless pathway."

* * * * * * *

A voluminous library would be required to contain the quotations which might be made from books, ancient and modern, showing that a great multitude of wise and illustrious medical authorities and their faithful disciples, from the dawn of history, have regarded alcohol, if not a panacea, certainly an indispensable help in the management of many or most diseases. And this unanimity of opinion and assurance of faith was founded on the inerrant testimony of experience. Indeed the large majority of eminent medical authorities and teachers still advocate the use of alcohol as the best of all stimulants, and appeal to their own clinical observations as ample justification of their practice. The less eminent members of the profession, the compilers of books, and the busy practitioners simply follow their leaders without investigation and without question.

* * * * * * *

Regarding the action of alcohol and its value in the treatment of disease, a great diversity of opinion exists in the profession. Many eminent physicians, and the number seems to be increasing here and abroad, from careful study and experiment, and from a prolonged disuse of the drug as a beverage or a medicine, have

arrived at the conclusion that alcohol is a depressant rather than a stimulant; that it is not a food; that its power to check the metabolism of tissues, and delay the excretion of effete products from the system, is not a benefit; that it does not promote digestion, but retards it; that it is the cause of many diseased conditions; that the substitution of other drugs, in cases in which alcohol is claimed to be beneficial, is productive of better results; and that there can be no reasonable doubt that the daily use of alcohol by members of the community, as a beverage, or as a remedy, with all its possible and actual evils, is in many instances, *the outcome of the well-intended prescriptions of family doctors.*

* * * * * * *

Now, if it should turn out that the use of alcohol, besides being hazardous, is always unnecessary, such cardiac, cerebral and other stimulants as strychnine, strophanthus, digitalis, ammonia, caffeine and nitroglycerin being able to fulfil all demands for which alcohol has been administered, what a load of responsibility will rest on the text-books, the very latest of which inculcate, with increased vehemence, a doctrine which may do immeasurable personal injury to the great host of medical graduates sent out every year, and to the trusting communities which expect and deserve from their medical attendants wise benefactions unmixed with baneful ingredients!

* * * * * * *

If the medical journals of the country, instead of advertising and commending medicated wines, intoxicating malt extracts and well-aged whiskies, would intimate that the non-alcoholic treatment of diseases deserves a fair trial, and, if their readers would personally test this treatment, no harm, but an immense amount of good, might be the outcome.

TREATMENT OF SOFT CHANCRE.

A Hungarian practitioner, Dr. E. Szanto, has come to the conclusion that, of all the means employed against soft chancre, salicylic acid is the best. He uses it in the form of an ointment, as follows:

℞	Acid. Salicylic,	gr. xv
	Vaselin,	℥ i
	Tinct. Benzoin,	ʒ ss

M.—Sig.: For external use.—*Buffalo Med. and Surg. Journal.*

"A GOOD JOKE ON THE DOCTOR."

In Philadelphia, recently, an old morphinomaniac, who for many years had been accustomed to take about twenty grains of morphine a day, called upon the principal physician of the neighborhood, and, for the symptom complained of, was a given a prescription for the one-twenty-fourth of a grain of morphine. For a month or more the old man has been showing everybody the prescription, and has had unlimited amusement over the doctor's hasty diagnosis and routine treatment.—*Philada. Med. Journal*, January 8, 1898.

HYDRASTIS AND VIBURNUM IN THE TREATMENT OF DYSMENORRHŒA.

The following formula is given in the *Journal de Médecine de Paris* for January 2d:

℞ Tinct. Hydrastis Canad., } equal parts.
" Viburnum Prunifolium, }

M.—Ten drops to be taken every two hours.

STRYCHNINE IN CHLOROFORM POISONING.

In a desperate case of voluntary poisoning with chloroform, after the failure of all other means, the patient was restored by injecting, several times, about 3 centigrammes of strychnine, seconded by artificial respiration and electricity. No deleterious effects were noted. —*Semaine Méd.*, December 15, 1897.

FOR CHAPPED HANDS.

℞	Menthol,	gr. xxiv
	Salol, } āā	gr. xlv
	Ol. Olive, }	
	Lanolin,	℥ iii

M.—Sig.: Apply to the hands twice daily.—*Med. News*, Dec. 25, 1898.

X-RAYS IN MILITARY SURGERY.

The Roentgen rays are being employed with great success in cases of gunshot wounds among the British troops in India, in locating splinters of lead, which would otherwise escape detection, as well as fractures and splinters of bone.—*Med. News*, January 1, 1898.

THE USE OF SCOPOLAMINE AMONG THE INSANE.

Dr. S. Tomasini has employed the hydrobromate and sulphate with equal results. They are injected subcutaneously in dose of from $\frac{1}{250}$ gr. to $\frac{1}{64}$ gr. Sleep was readily induced, especially in women, in from two to three minutes. The injections are not pain-

ful, nor do they give rise to local reaction nor to general excitation. The pulse is regular, but more frequent.

There is marked dilatation of the pupils; the sleep is quiet, resembling the physiologic. There are no disturbances nor unpleasant symptoms, as nausea. In maniacal cases and periodic insanity, it is a remarkable sedative. Habituation is easily obtained, and the dose must be rapidly increased.—*Riforma Medica.*

FILTRATION OF MILK.

In several European cities sand filtration of milk is employed at a central depot after its arrival from the country. The filters consist of large cylindrical vessels, divided by horizontal superposed compartments, of which the middle three are filled with fine clean sand, sifted into three sizes, the coarsest being placed in the lowest and the finest in the topmost of the three compartments.

The milk enters the lowest compartment through a pipe under gravitation pressure, and, after having traversed the layers of sand from below upward, is carried by an overflow to a cooler fed with ice water, whence it passes into a cistern, from which it is directly drawn into locked cans for distribution. Milk thus treated is not only freed from dirt, but the number of bacteria is reduced to about one-third. In new milk the loss of fat is said to be very slight, but the quantity of mucus and slimy matter retained in the sand is surprising. The sand is renewed each time the filter is used.—*Medical News*, January 8, 1898.

THE REMOVAL OF WARTS.

Warts can be removed painlessly, and with the avoidance of scars, by applying a supersaturated solution of potassium bichromate once daily.—*Med. News*, Jan. 8, 1898.

AN OINTMENT FOR MUMPS.

℞ Ichthyol, Plumbi Iodi., } āā		gr. xlviii
Ammon. Chloridi,		gr. xxx
Vaselin,		℥i

M.—Ft. ungt. Sig.: Apply with friction over swollen glands three times daily.—*Med. News*, January 22, 1898.

ADDITIONS TO THE BRITISH PHARMACOPŒIA.

The Medical Chronicle, Manchester, England, December, 1898, contains a very interesting article by Dr. A. T. Wilkinson, which is

commended to the revisers of our own pharmacopœia. Among other things, he says: "It is of no use shutting our eyes to the fact that modern manufacturing chemists and patent medicine vendors are beginning to revolutionize the methods of preserving and administering drugs. Years ago homeopathy was really a revolt against the over-physicking habits of our forefathers, and it has been sustained much more by its practice than by its principle. Though most of us believe that in strict homeopathy there is but little left but the "*suaviter in modo*," we may nevertheless learn a lesson therefrom. We all feel that it is our duty to present our medicines to our patients, and especially to children, in the least objectionable form. The time has gone by when the administration of medicine was considered wholesome discipline.

* * * * * * *

You cannot present a 5-grain "B. P." pill of carbonate of iron to a young child, but at four years of age one of my own children enjoys 10-grain vanilla jelloids, and greatly benefits thereby. Why is the so-called Tamar Indien so largely sold in spite of its price? Because even the baby of the house will ask for it as "goody," and, like the toffee of a lady friend of mine, that is made with castor oil instead of butter, the box has to be kept out of the way for fear of disastrous results. Now, gentlemen, if we are not to prescribe proprietary medicines, it must be possible for us from the "B. P." to present the drugs to our patients in an equally palatable form.

* * * * * * *

The globules, tabloids, jelloids, palatinoids, capsules and what not at present in the market, suggest ways by which the older preparations might be supplemented or supplanted. We could also do with an innocent, well-flavored, soft, or, at any rate, easily masticated lozenge, with which any prescribed drug could be incorporated.

Indeed, although the present method of indicating by special preparations in what form drugs are most advantageously dispensed be adhered to, it would not be amiss to supply, in the "B. P.," formulæ for each of the elementary preparations in which the excipients alone are included. This would leave the prescriber absolutely free in his choice of the active ingredients, and thus enable him to keep to the "B. P." whilst avoiding the everlasting mixture and pills.

RECENT LITERATURE RELATING TO PHARMACY.

EXTRACTION OF GUTTA PERCHA FROM LEAVES.

An account of this industry as it is carried on at the Straits Settlement, India, is given in the issue of *Kew Bulletin* for May and June, 1897. The leaves are imported dry in sacks from Borneo and Johore. The trees are overcut in Singapore, and it is reported that there are no more leaves left. The leaves and twigs cost $4.50 a picul (133 pounds). They are put, damped with hot water, into a rolling machine, two rollers working against each other, which grind them to powder. The powder is thrown into tanks and shaken about. The gutta percha floats in the form of a green, mealy-looking stuff. It is lifted out by fine copper gauze nets, put in warm water and pressed into moulds. It is said to be a very curious little manufactory. It is thought that, on account of the difficulty of procuring leaves, the trade will sooner or later stop.

THE PREPARATION OF PURE IODINE.

Bevan Lean and W. H. Whatmough (*Chemical News*, Vol. 77, No. 1993) state that iodine is most conveniently prepared from cuprous iodide by heating it in a stream of dry air at 220° to 240° and condensing the vapors upon a cold surface. Although the greater portion of the iodine is quickly expelled from the copper salt, it is not easy to expel the whole. After heating 1·7101 grammes at 400° for eighteen hours, 0·15 per cent. of the iodide was still undecomposed. The authors proved that the action of air upon cuprous iodide is not dependent upon the presence of moisture. This they did by sealing cuprous iodide in glass tubes in the presence of phosphoric anhydride.

The iodine obtained at 240°, as described above, leaves no residue when volatilized at 75°. Neither does an examination with the spectroscope give any evidence of the presence of copper. The melting point (uncorrected) is 112·5° to 114°.

The authors have also discovered that cuprous iodide can be prepared by sprinkling iodoform in small quantities at a time upon a hot surface of copper, the product being free from bromide or chloride.

A NEW SYNTHESIS OF GLYCERIN.

O. Piloty (*Berichte*, xxx, 3161) reports a new synthesis of glycerin, which result is not only a matter of technical interest, but is also

extremely interesting on account of the analogy which it bears to the generally accepted theory of the formation of sugars in plants.

By treating the oxime of dihydroxyacetone ($CH_2OH{\cdot}C{:}N{\cdot}OH{\cdot}CH_2OH$), which can be prepared by the action of formaldehyde on nitromethane, with bromine, nitrous oxide is given off and dihydroxy acetone remains as one of the products. This compound ($CH_2OH{\cdot}CO{\cdot}CH_2OH$) is the simplest member of the group of sugars known as ketoses, and heretofore has been prepared only in a more or less impure condition by the oxidation of glycerin. The pure substance possesses the well-known characteristics of the sugars, and with phenylhydrazine forms an osazone. By reduction it is converted into glycerin, and thus the last step in a new synthesis of the latter compound is effected. By many writers formaldehyde is thought to be one of the first products formed in plants by the assimilation of carbon dioxide, and that the sugars are ultimately built up through its condensation.

BUTTER AND TALLOW TREE OF SIERRA LEONE (PENTADESMA BUTYRACEA, DON).

Kew Bulletin, in a recent issue, published some interesting information relating to an investigation into the probable value of the seeds of this tree as a source of oil. But, owing to the depressed condition of the market for oil-seeds, the result is not very promising. The tree is described as follows: This noble tree of West Africa is a member of the Gamboge order (Guttiferæ). It extends from Sierra Leone southward to the mouths of the Niger, and beyond to the equator. It sometimes attains a height of 70 feet; the large glossy leaves are from 5 to 10 inches long, the flowers are abundant, very handsome, and succeeded by a large, lemon-shaped brown berry, 6 inches long and 4 to 5 inches in diameter, with one or two, or sometimes numerous, seeds. The plant was described by Sabine in the *Transactions* of the *Horticultural Society* (Vol. V, 1824, p. 457) as the "Butter and Tallow tree." It has recently been figured in *Hooker's Icones Plantarum*, pl. 2465 (1896), with a description by Professor Oliver. It is known in Sierra Leone as the "Kamoot" tree. Prof. E. Heckel, in his monograph, *Les Kolas Africains*, refers to it as the "Kanya" tree, and the oil or butter yielded by the seeds as *beurre de Kanya.*

It is also said that the oil is highly esteemed by the natives of the

interior, and that it is preferred by some of them to palm oil on account of its better flavor. The oil is extracted by drying the seeds and parching them over a fire. They are then pounded in a mortar; water is added and the whole boiled and the fat or oil skimmed off as it rises. Recent analysis shows the seeds to contain 41 per cent. of oil, which appears best adapted for soap making.

PREPARATION OF ABSOLUTE ALCOHOL BY THE USE OF CALCIUM CARBIDE.

M. P. Yvon (*Comptes Rendus*, cxxv, No. 26) has found that when coarsely-powdered calcium carbide is brought into contact with alcohol (90 to 95 per cent.), evolution of acetylene gas takes place and continues as long as any water remains in the alcohol.

This reaction, therefore, affords a very simple means of determining whether an alcohol is anhydrous. In order to test a sample, a few cubic centimeters of the alcohol are put into a test-tube and a few grains of the coarsely-powdered carbide are added. If no water is present, no gas-bubbles appear, and, on shaking, the liquid remains clear. But if the mixture contains even traces of water, small gas-bubbles form, and, on shaking, the mixture becomes cloudy, owing to the formation of calcium hydrate.

To prepare absolute alcohol, a quantity of 90 or 95 per cent. alcohol is placed in a flask with one-fourth its weight of calcium carbide, coarsely powdered. The reaction is allowed to proceed a few minutes, or until it becomes less vigorous, and then the flask is shaken frequently during two or three hours, after which it is allowed to stand for twelve hours. The flask is again shaken, and, if necessary, a little more of the carbide is added. The mixture is then distilled. The first portions of the distillate contain some acetylene in solution, and are collected in a separate vessel. The distillate afterward collected constitutes the product desired.

A more satisfactory method consists in collecting all the distillate in one vessel and adding to it a small quantity of dried copper sulphate. This latter takes up the acetylene present, and the product formed need not be separated before a second distillation is carried out.

PURE CALCIUM GLYCEROPHOSPHATE.

Continuing their experiments on the glycerophosphates, Adrian and Trillat propose the following method for preparing the pure

calcium salt: Equal parts of glycerin and phosphoric acid are gradually heated on a sand-bath in an enamelled vessel to 130° and 150° C., and maintained at that temperature for twenty-four hours, when the dark-colored viscid mass begins to evolve acrid fumes. Instead of calcium carbonate, the authors use tribasic calcium phosphate to combine the free phosphoric acid, since effervescence is thus avoided. The free phosphoric acid forms with this dibasic calcium phosphate; milk of lime is then added in excess, which combines with the glycerophosphoric acid and again precipitates the phosphoric acid as tribasic calcium phosphate, which is filtered out and again used in subsequent operations. The filtrate is concentrated to a pasty consistence, then poured into 10 parts of alcohol, and boiled for an hour. After draining it is again treated with alcohol and precipitated by heating, collected, and dried on the water-bath. The authors have obtained the salt in the form of a micro-crystalline powder by precipitating the aqueous solution by boiling, when it forms minute, well-formed needles. These, however, at once lose their crystalline form on exposure to the air, and disintegrate even on the microscope slide while under observation. Analysis of the salt gave figures corresponding to the anhydrous salt of Pelouse, and did not support the statement of Portes and Prunier that it contains two molecules of water. The solubility of the glycerophosphate in water at 25° C. was found to be 4·53 in 100.—*Jour. de Pharm.* (6), vi, 481, through *Pharmaceutical Journal*, January 29, 1898.

HOW THE BANANA IS GROWN.

In the February number of *The Cosmopolitan* appears an article on the above subject, by Frederick S. Lyman, from which we select the following as of interest to our readers:

Before Revolutionary times Cuba shipped many hundred thousands of bunches a year to northern markets, and will yet do so again; and Jamaica has in the three parishes of Portland, St. Mary and St. Thomas 1,500 acres under cultivation. But the land of the banana *par excellence* is Costa Rica. From Costa Rica come the best and largest bananas that are sold in the New York and New Orleans markets, the bunches weighing from 25 to 100 pounds each. In 1896 about 2,000,000 bunches were shipped from Port Limon, and the number for 1897 must have reached 3,000,000.

The most famous banana district in Costa Rica is that of Matina.

Once or twice a year the Matina River overflows its banks, bringing down with it a vast amount of silt, which it distributes over the low-lying lands to the depth of several inches. This silt is a fertilizer of the richest kind. In this district banana trees often reach a height of 35 feet, a height rarely attained by this species elsewhere.

When a piece of forest land is to be planted in bananas, a gang of laborers is first set to clearing away the underbrush—no easy task in such a clime. Then with a long rope are measured off rows six yards apart to be planted with "bits," cuttings from the banana root. At every six yards in the length of rope is tied a piece of red tape, and at every piece of tape a stake is driven into the ground to mark the holes to be dug for the "bits." The "bits" once planted, the men are put to work with axes to cut down the trees.

In six months' time the banana rows must be cleaned; in ten months all the weeds have to be cut down, and in twelve months from the time of planting the first crop or "cutting" is obtained.

On rich land the trees produce fruit the year round and keep on bearing from thirty to forty years, and will yield 400 bunches a year per acre.

The planters receive from 15 to 30 cents a bunch for the banana fruit, according to the size, and it is interesting to contrast these prices with the price in New York, where, within a week's time, a 30-cent bunch will likely retail for $10. But, in making this comparison, it must be remembered that the planter runs very little risk, his crop being sure and steady, whereas the shipper occasionally meets with severe losses.

Botanists assert that the banana is not a native of Central America and the West Indies, but that it has been imported from the tropical lands of the East. But, as the author observes, it seems to thrive better in its new home than in its native soil.

The varieties of bananas cultivated in Costa Rica are as numerous as the varieties of apples in northern climes. While the red-skinned bananas are considered the superior in the New York market, the yellow-skinned are much the more common, as, being less juicy, they stand the trip better and do not decay so quickly.

The best authorities now agree that there is no specific difference between the banana and plantain, and that the names are frequently interchanged.

While in Costa Rica the fruit is used extensively for food, it is by

no means the main dependence of the natives, as it is on many islands in the Pacific. A useful and nutritious flour is extensively made by grinding the unripe fruit after it has been dried in the sun.

Analysis shows that this banana flour contains a very large quantity of starch, an average of more than 71 per cent. having been found. This element, which is so prominent in the immature fruit, changes into sugar as the fruit ripens, and gives the banana its sweetish taste.

CINCHONA.

The quantity of quinine in the cinchona-bark offered at the ten Amsterdam auctions of 1897 fell considerably below that offered in 1896, and would, indeed, have carried us back to the figures for 1895 but for the huge supplies offered at the December sales. Weight for weight, the supplies of bark actually fell below those for 1895 as well as of 1896, but it is too often forgotten, in speculating upon the future of the bark-supply, that while the output of the Island of Java is falling, the alkaloidal richness of the bark continues to rise. Thus, the average richness (in quinine) of the Java manufacturing bark in 1897 shows an increase of nearly 5 per cent. on that of the year before, and of over 43 per cent. since 1889. The actual average unit for each year, and its percentage increase upon its predecessor during the past seven years are shown in the subjoined table:

	1891.	1892.	1893.	1894.	1895.	1896.	1897.
Average unit per cent.	4·08	4·50	4·60	4·93	5·01	5·48	5·73
Per cent. increase on the year before	2	10	2	7	2	9	5

From the bottom line it will be noticed that the average unit has generally taken a big step forward every second year. If this tendency be maintained in the same ratio during the twelve-month just commenced, the average quinine-content of the manufacturing bark offered at Amsterdam this year will be over 6 per cent. Hitherto such a unit has only been attained in the auctions of August and September, 1897, and a few years ago it would have been looked upon as wildly improbable.

The "syndicate"—if we may call it by that name—of Java planters and Amsterdam brokers that has undertaken the task of raising the unit-price by concerted action during a preliminary period of three months commenced its operations at the auctions of

Thursday last. It only succeeded in preventing the bark from falling below an average unit of 6·90c. per half-kilo., which is certainly a Pyrrhic victory. It may be urged that, without the stand made by the "syndicate," the unit would have been down to 4 or 4½c. per half-kilo., and every advantage lost that was gained during the autumn. Still, if the planters cannot do better in February and March than they did last Thursday, their co-operation will probably not outlive the initial three months, and the last state of the planting interest will be worse than the first, for the decisive defeat of a "syndicate" that started under such favorable auspices as the present will probably deter others from trying the policy of concerted action afresh. We have often expressed the belief, to which we still adhere, that the Java planters could have obtained effective control of the bark-market if they had known how to seize the right moment, and had had the right man to lead them. But we are afraid that that time is now gone for good, and so far we have seen no evidence of the existence of a man qualified to fight the quinine combination successfully. This does not imply that we take a gloomy view of the quinine market—far from it—but we do incline to the belief that the planters will shortly fall more helpless victims to the quinine "combination" than they have ever been before. The quinine-makers are a small but highly-organized body, the planters a mere undisciplined mob. It seems, indeed, from the sale catalogue of the last Amsterdam auction, that the firms who took a leading part in the December conferences that led to the scheme for concerted action did withdraw the bulk of their cinchona at prices above the unit obtainable at the auctions, but there appear to be plenty of others only too ready to take the places of those who refuse to sell. And yet there are many factors which would make a combination of cinchona-planters more easy to manage than many another syndicate that has for years held its own in the face of adverse circumstances. For one thing, 85 per cent. of the available quinine-supply of the world is produced in one island, and by less than 100 firms. Next, it is highly probable that the bulk of the great factories have not more than a moderate stock of bark on hand, and that there is no excessive cinchona stock in second hands to harass the action of a combination. Further, a bark combination would be free from the great trouble of other syndicates in raw products that new supplies may be discovered at any moment. It

takes time for new cinchona plantations to come into bearing, and no danger could threaten from South America, unless the price were raised exorbitantly.

With regard to the quinine factory which the combined German makers are said to contemplate establishing in Java, at Pengalengan, the promoters of the undertaking in Java have published a statement to the effect that the projected factory is entirely "national" (*i. e.*, Dutch), and that neither German nor English manufacturers are concerned in it. We believe that this is only technically correct, and that, in fact, the promoters of the Pengalengan works are connected with the Amsterdam quinine works, which, in turn, are closely allied with the firm of Böhringer & Sons, of Manheim.—*The Chemist and Druggist*, January 29, 1898.

The Philadelphia Museums.—These museums had their origin in the successful movement to secure the vast exhibits of natural products from the numerous countries represented at the Chicago exhibition of 1893. These exhibits were presented to the municipality of Philadelphia, who have devoted a large sum of money to their proper installation. In addition to the exhibition there is the scientific and commercial library, with its free reading-room, where may be found a large number of statistical and scientific works, valuable to both producers and consumers. A laboratory has also been started as an adjunct of the scientific department of the Philadelphia Commercial Museum, its main object being the examination and analysis of raw materials and manufactured products. The system of this laboratory, which is free to all, will conform closely to that in use in England and on the Continent, and all tests will be made independently in duplicate by two observers, thus insuring a high standard of accuracy.

Cinchona in India.—Mr. J. E. O'Conor, Director-General of Statistics for India, states in his report for the official year 1896–97 that there were 5,916 acres of land under cinchona cultivation, of which about 72 per cent. was situated in Southern India, the remainder being in Bengal. The area in Bengal, comprising 1,636 acres, lies in and near Darjeeling. In Southern India there are 1,762 acres, in the Nilgiris; 731 in Malabar, 1,402 acres in Travancore, 335 acres in Mysore, 8 in Coorg, and 42 in Madura. In Bengal the land under cinchona was, in the main, planted and is maintained by Government, the plantations of the State covering 1,556 acres, but in the Madras Presidency the industry is largely in private hands, the State plantations covering under 800 acres. During the twelve years ending 1896–97 the area under cinchona has fallen from 10,418 acres to 5,916 acres. There has been a substantial decline in Bengal, as well as in Madras, and in Coorg the cultivation has been almost entirely abandoned.—*The Chemist and Druggist*, January 29, 1898.

EDITORIAL.

LIQUEFIED AIR.

The liquefaction of air can scarcely be considered new, but the production of liquid air has only recently been accomplished in this country on a commercial scale. This fact was made public through the daily papers only a few weeks ago, and, consequently, has not yet appeared to any extent in the scientific journals. A quantity of the liquid, 2½ gallons, was brought from New York to Philadelphia in a milk-can without any special precautions. In its normal condition, air, as we know it, is a gas, just as, in its normal condition, water is a liquid; but if we lower the temperature of the air or increase the pressure on it, or both, to a sufficient degree, we reach a point at which condensation takes place. The liquefaction-point of air under normal atmospheric pressure is — 191° C.

A process for the commercial manufacture of liquid air was described in 1895 (*Journal of the Society of Chemical Industry*, Vol. 14, page 984), but the results do not appear to have been on a very large scale. In the present instance the successful production of liquid air is claimed by Mr. Charles E. Tripler, of New York. His process is based upon the well-known fact that if a gas be compressed and then allowed suddenly to expand, it absorbs the heat of the surrounding medium, thereby producing intense cold.

According to this method, air is subjected to a pressure of 2,000 pounds to the square inch, passed through a coil and permitted to issue from a needle-point orifice. There it expands and cools. This cold stream of air circulates around a second coil through which compressed air is flowing, reducing the temperature of the latter. The air issuing from this second coil has its temperature lowered to a point due to its own expansion, plus the cold imparted from the first expansion. The expanded and extremely cold air from the second coil is used similarly to cool a third coil, the air in which is brought down to a temperature of — 191° C. and below, at which it condenses and flows from the end of the coil in a liquid stream.

It is of interest to note some of the properties of this new product. Tin placed in the liquid causes it to boil, the tin becoming brittle as glass. Copper and platinum are not so affected, hence it is believed that these metals will make suitable containers for the liquid. When heat is applied to it, it boils, as would naturally be supposed, with excessive ebullition; but when water is poured into the boiling liquid the water is instantly frozen. Alcohol and mercury are likewise frozen when brought in contact with the liquid.

Whatever may be the economic applications of this interesting product, it is pretty certain to play an important part in laboratory experimental work. Attention was called to the fact, in 1895, that when the liquid was boiled the nitrogen was vaporized first, so that the latter portions consisted of nearly pure oxygen. It was then shown that oxygen could be prepared by mechanical means. Other uses for this liquid will, no doubt, rapidly suggest themselves.

Especially does it seem probable that it will become one of the most economical means of producing artificial cold. Since mechanical means only is necessary for its production, it ought to become very cheap, and at the same time it will be free from the dangerous character of liquid ammonia.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

Formulaire des Médicaments Nouveaux. Par H. Bocquillon-Limousin, ninth edition. Libraire J. B. Baillière et Fils, Paris, 1898.

Each year this publication increases in size and value. The most notable additions of the present edition are: Cacodylic acid, Cardol, Chelidonine, Chinapthol, Chrysoïdine, Cryophine, Eucaïne, Holocaïne, Hydrogyraseptol, Ichtyalbine, Mydrol, Orthoform, Péronine, Phenylpilocarpine, Picronitric acid, Pyramidon, Spinol, Tannalbine, Tannosal, Triphénine. There have also been added a number of plants new in therapeutics, which have been introduced from the French colonies and other foreign sources. A large number of formulas for the pharmaceutical preparations of the new drugs are scattered through the wo.k. It is a book which will be found useful by the pharmacists of every nationality.

Observations on Recent Cases of Mushroom Poisoning in the District of Columbia. By Frederick V. Coville. Department of Agriculture, Circular No. 13. Revised edition. Washington, D. C., January 4, 1898.

The present revision of this timely bulletin is in keeping with the demands for information on such an important and interesting subject. Several new cuts have been added and the text increased by nearly three pages, thus making a circular of twenty-four pages.

Calendar of the Pharmaceutical Society of Great Britain, 1898. As is usual, this Calendar contains an account of the educational and benevolent work of the Society, and also much information useful to pharmacists and chemists.

Proceedings of the New Hampshire Pharmaceutical Association, with the Report of the Commissioners of Pharmacy.

At the Twenty-fourth Annual Meeting held at Manchester, N. H., September 7 and 8, 1897, two papers were presented by Dr. Charles Tufts, entitled respectively, "The Word Apothecary" and "Preliminary Education for an Apothecary."

Proceedings of the Twentieth Annual Meeting of the Kentucky Pharmaceutical Association, held at Crittenden Springs, Ky., June 15–17, 1897.

At this meeting papers were presented as follows: "A Business Remedy," by O. C. Dilly; "The Druggist as a Merchant," by Vernon Driskell, and "A Posse ad Esse—The Remedy," by G. A. Zwick.

MINUTES OF THE PHARMACEUTICAL MEETING.

Philadelphia, February 15, 1898.

The regular Pharmaceutical Meeting was held in the Materia Medica Lecture Room, with Dr. C. B. Lowe in the chair. The minutes of the previous meeting were allowed to stand as published.

The meeting was unusually well attended, and proved to be one of the most interesting of the present series.

The Registrar presented, in behalf of Messrs. McIlvaine Bros., Philadelphia,

the following: Samples of metallic antimony and antimony ore and specimens of white, or purging, Agaric, and Scopola japonica, the latter being said to be used to a considerable extent in the manufacture of belladonna plasters, on account of the atropine which it contains.

The first speaker introduced was Mr. Jokichi Takamine, now of Detroit, but formerly a resident of Japan, who presented, in a very pleasing manner, an address on the subject of "Diastatic Fungi and their Utilization" (see page 137).

Before taking up the subject proper of his address, Mr. Takamine said, in reply to the remarks of the chairman on the rapid advancement of the Japanese in the arts and sciences, that what his country had accomplished in recent years was due to American enterprise. Other countries had been opened at the cannon's mouth, but, through the treaty negotiated by Commodore Perry, the eyes and hearts of the Japanese people had been opened, and, as a result, a great impulse given to the study of the applied sciences. Through the influence of physicians, the study of medicine was the first to be undertaken by them, and to-day the majority, or at least half, of the members of the governmental cabinet of Japan are members of the medical profession.

In discussing the relative action of diastatic substances, Mr. Takamine advanced some interesting theories in explanation thereof. He said that all cereals possess certain diastatic power. This he had verified experimentally. According to his theories, Taka-diastase, or the diastase produced by fungi, is composed of one starch-saccharifying unit in proportion to three starch-liquefying units, while cereals contain only starch-saccharifying units, which do not have full starch-converting action, until combined with starch-liquefying diastase, when the combined potency is increased. Malt was represented as containing an equal proportion of these two kinds of starch-converting units.

Accompanying the address were micro-photographs of both diastatic and non-diastatic fungi, and photographs and sectional drawings of the buildings used by Messrs. Parke, Davis & Co. in the production of diastase from fungi, these all being exhibited by means of the electric lantern.

In the general discussion which followed, Mr. J. W. England wished to know what tests are used for Taka-diastase and what advantages it has over malt in the treatment of amylolitic dyspepsia. The answer as given by Mr. Takamine to the first query is embodied in the article on page 141.

The advantageous qualities claimed for Taka-diastase by him were stability, and freedom from sugars. He said that malt is a nutrient of itself, but that in dyspeptic troubles attended by fermentation the sugars present in malt have a tendency to aggravate the trouble.

In answer to a question by Professor Remington on the stability of Taka-diastase in solution, Mr. Takamine said that it does not lose its diastatic activity at a temperature of 65° C., but at 75° C. it is completely destroyed.

Others taking part in the discussion were the chairman, Prof. S. P. Sadtler, Dr. A. W. Miller and Mr. L. F. Kebler.

A hearty vote of thanks was tendered Mr. Takamine for his excellent address.

The next speaker on the programme was Prof. Henry Trimble, who contributed a paper on "An Exudation from Larix Occidentalis" (see page 152). A sample of the exudation received from Prof. C. S. Sargent was exhibited.

Two samples of oil of bay were presented by Dr. Miller. He reported that

one of these had been treated in a manner to make the specific gravity conform to the official standard, and that the other was the normal product.

On motion, the meeting adjourned.

THOS. S. WIEGAND,
Registrar.

THE AMERICAN MEDICAL ASSOCIATION.

Section of Materia Medica and Therapeutics.—The following papers and discussions have been promised for the meeting at Denver, Col., June 7–10, 1898:

"Yellow Fever: Its Etiology and Treatment." Discussion by Surgeon-General George M. Sternberg, M.D., of Washington, D. C.: Professor John Guitéras, M.D., of Philadelphia; Sollace Mitchell, M.D., of Jacksonville, Fla.; T. S. Scales, M D., of Mobile, Ala.; G. B. Thornton, M.D., of Memphis, Tenn.; H. M. Bracken, M.D, of Minneapolis, Minn.; P. E. Archinard, M.D., of New Orleans, La.

"Aims of Modern Treatment of Tuberculosis." By Professor Edwin Klebs, M.D., of Chicago. Discussion by Charles Denison, M.D., of Denver, Col., C. H. Whitman, M.D., of Los Angeles, Cal.

"Serum Therapy of Tuberculosis." By Prof. S. O. L. Potter., M.D., of San Francisco, Cal. Discussion by Professor James M. Anders, M.D., of Philadelphia.

"The Therapeutics of Pulmonary Phthisis." By Paul Paquin, M.D., of St. Louis, Mo.

"Tuberculin as a Diagnostic and Curative Agent, with Report of 250 Tubercular Cases Treated" By C. H. Whitman, M.D., of Los Angeles, Cal.

"The Pract'cal Value of Artificial Serum in Medical Cases." By P. C. Remondino, M.D., of San Diego, Cal.

"The Use of Remedies in Diseases of the Heart and Blood-vessels." By T. Lauder Brunton, M.D., D.Sc., F.R.S,, London, England.

"The Mescal Button." By Prof. D. W. Prentiss, M.D., of Washington, D. C.

"The Modern Intestinal Antiseptics and Astringents." By William Frankhauser, M.D., of New York.

"To What Extent is Typhoid Fever Favorably Modified in Its Course, Duration, Termination or Sequelæ by the Administration of Drugs?" By Frank Woodbury, M.D., of Philadelphia, Pa.

"Strychnine." By J. N. Upshur, M.D., of Richmond, Va.

"Methods of Teaching Materia Medica and Therapeutics." By Prof. G. H. Rohé, M.D., of Baltimore.

"The Study of Materia Medica and Therapeutics." By H. M. Bracken, M.D., of Minneapolis, Minn.

"The Great Therapeutic Importance of a Rational Adaptation of Cathartic Remedies to the Physiological Functions of the Gastro-intestinal System." By E. D. McDaniels, M.D., LL.D., of Mobile, Ala.

"Why the Pharmacopœial Preparations Should be Prescribed and Used by the Profession. By Leon L. Solomon, M.D., of Louisville, Ky.

"The Use of Electricity by the General Practitioner." By Caleb Brown, M.D., of Sac City, Ia.

The following have also promised papers, subjects to be announced very soon, together with the day assigned for each discussion and paper:

Dr. J. E. Atkinson, of Baltimore, Md.; Dr. Henry Beates, of Philadelphia, Pa.; Dr. T. M. Balliet, of Philadelphia, Pa.; Dr. George F. Butler, of Chicago, Ill.; Dr. Dudley W. Buxton, of London, Eng.; Dr. J. Solis-Cohen, of Philadelphia, Pa.; Dr. N. S. Davis, Jr., of Chicago, Ill.; Dr. P. J. Farnsworth, of Clinton, Ill.; Dr. J. E. Moses, of Kansas City, Mo.; Professor Joseph P. Remington, of Philadelphia, Pa.; Prof. L. E. Sayre, of Lawrence, Kan.; Dr. H. V. Sweringen, of Fort Wayne, Ind.; Dr. E. L. Stephens, of Forth Worth, Tex.

The chairman will be pleased to receive and place upon the programme subjects for discussion and papers. John V. Shoemaker, M.D., Chairman, 1519 Walnut Street, Philadelphia, Pa.

NOTES AND NEWS.

The Monthly Cyclopædia of Practical Medicine will replace the *Universal Medical Journal.* The editor is Dr. C. E. de M. Sajous, and in the first number he considers the "Treatment of Cancer" editorially, and presents some valuable suggestions.

Die Heilpflanzen der Verschiedenen Völker und Zeiten is the title of a work to appear in parts shortly, by Professor George Dragendorff. This work is sure to mark a distinct forward step in the study of the history, constituents and uses of medicinal plants.

The Fifth International Congress of Hydrology, Climatology and Geology will meet at Liege, Belgium, from September 25 to October 1, 1898. The General Secretary is Dr. G. Jorissenne, of Liege. The preliminary announcement gives the names of the officers and the rules which shall govern the Fifth Congress.

Pharmaceutical Archives is the title of a new journal to be supplementary to the *Pharmaceutical Review.* Dr. Edward Kremers is editor. This new journal will publish the more technical scientific papers, and the *Review* will aim to publish more abstracted matter. Both journals are under the business management of the Pharmaceutical Review Publishing Company, of Milwaukee, Wis.

Copper Sulphate in the United States.—The production of copper sulphate in the United States in 1897 was 49,000,000 pounds, against 48,732,840 pounds in 1896. The percentage of copper in this material is about 25. The greater part of the production of copper sulphate is made by chemical works in the East, but a good deal is turned out as a by-product by various gold and silver refiners.—*The Journal of the Society of Chemical Industry,* January 31, 1898.

Howards and Sons' supplement to the colossal number of the *Chemist and Druggist* of January 29 is, notwithstanding its advertising features, a dignified contribution of great historical interest. It marks the end of the first century of the firm's existence. The history of quinine is an important feature of the contribution, and it is interesting to note that the manufacture of this chemical was at first (about 1827) considered of such insignificant importance that the exact date when the first few lots were made has been lost, "though a thousand ounces then struck the imagination more than the million and a half ounces contained in the bark offered in one sale in Amsterdam the other day."

Georgia Phosphates.—A preliminary report on a part of the phosphates and marls of the State has just been published by State Geologist W. S. Yates. The report has been prepared by the Assistant State Geologist, S. W. McCallie. The conclusions of the document are as follows: The result of our investigations in the various countries lying along the Georgia-Florida State line demonstrates to a considerable degree of certainty two very important economic facts. First, that there do not exist anywhere along the State line with the exception, probably, of Thomas County, any deposits of phosphate of sufficient extent and purity to be mined with profit for the manufacture of commercial fertilizer at its present market value: Second, that all these counties contain more or less extensive beds of marl, or low-grade phosphate—a valuable natural fertilizer that might be used to a great extent in replacing the more costly manures. There can be little doubt that the deposits of marl are extensive, and equal in many respects the green-sand beds of New Jersey. In only a few instances have they been tried on growing crops, but in all cases they are reported to have produced beneficial results.—*The Journal of the Society of Chemical Industry*, January 31, 1898.

Petroleum in Java.—According to a French Consular Report, there are, in the district of Lidah and Koetei, 40 wells, with an average production of 19,800 gallons of oil, which could easily be increased to 25,000 gallons. Recent reports are to the effect that two new wells have been discovered, producing some 2,400 barrels per day additional. In the district of Panolan there are fifteen wells, the largest of which has a daily production of 2,400 barrels. The wells of Tinawen have been but little exploited. A company has obtained a ten-year concession for this district, and the probable yield is estimated at 1,600 cases a day. There are two refineries, and another in process of construction. The paraffin factory at Ploentoeran, which has a capacity of production of 6,000 pounds a day, is only partially in action. A factory at Wonokrano supplies all the oils necessary for the sugar refineries and for the railroads of Java. Statistics for the last eight years show that the production of refined petroleum on this island increased from 8,000 cases in 1889 to 1,250,000 cases in 1896. Java, on account of its geographical position, finds the cost of transportation to the Eastern markets comparatively small.—*The Journal of the Society of Chemical Industry*, January 31, 1898.

OBITUARY.

THOMAS J. HUSBAND.

The venerable druggist, Thomas J. Husband, died at his home, 241 South Eighth Street, this city, on January 21st, in the eighty-fifth year of his age. Mr. Husband was born in Maryland, but came to this city when quite young. He was apprenticed as a druggist, and in 1833 graduated from the Philadelphia College of Pharmacy, his graduating thesis being entitled "Experiments on Galipea Officinalis." He early identified himself with the work of the College by becoming a member, and in 1835 was elected a member of its Board of Trustees. Mr. Husband was for many years engaged in the retail drug business at Third and Spruce Streets, but was best known to the drug trade at large as the originator and manufacturer of "Husband's Magnesia."

Mr. Husband belonged to the Society of Friends, and was esteemed for his fine personal qualifications.

ALFRED BOWER TAYLOR.

THE AMERICAN
JOURNAL OF PHARMACY

APRIL, 1898.

ALFRED BOWER TAYLOR.

Alfred Bower Taylor, son of Joseph Taylor, was born January 6, 1824, at his parents' home, 448 N. Sixth Street, Philadelphia. He was educated at Haddington Boarding School, and at the University of Pennsylvania, graduating from the latter institution in 1841. He entered the drug business after leaving the University, Henry C. Blair, 800 Walnut Street, Philadelphia, being his preceptor. He graduated from the Philadelphia College of Pharmacy in 1844. Subsequently going to New York, he entered the establishment of Rushton & Co., on Broadway, afterwards engaging with Hegeman & Co., prominent druggists of that city. Returning to Philadelphia in 1847, he bought the drug store at the Northeast corner of Eleventh and Walnut Streets, from the executors of the Estate of Augustine Duhamel. Here he remained until 1853, when he moved to larger quarters at the Southeast corner of Ninth and Walnut Streets. He continued in business at this location for seven years, and in 1861 moved to a larger store at 1015 Chestnut Street, where he conducted a successful business. In 1876 he moved to 31 S. Eleventh Street, and, after continuing in business at this location for five years, again moved, going to Ninth Street below Chestnut, under the Continental Hotel, and it was after being there a few years that he retired from business. During the remaining years of his life he held the position of secretary to Professor Joseph P. Remington.

It will thus be seen that Alfred B. Taylor had an experience of nearly forty years in the retail drug business, but it was not as an apothecary that his greatest service to Pharmacy was rendered, he

having filled with marked ability many laborious and public positions. In 1848 he was appointed Inspector of Drugs for the Port of Philadelphia, and it was probably because of his interest in this department of pharmaceutical activity that he was elected the *first Secretary* of the American Pharmaceutical Association, at the initial meeting which convened in the city of New York in 1851, twelve members being present. He served the Association as secretary until 1854, and in 1890 was elevated to the highest office in the gift of the Association—that of president.

He was also the first treasurer of the Association (1852), and the second local secretary (1867).

His connection with the Philadelphia College of Pharmacy began in 1841, when he matriculated as a student, and he served in his *Alma Mater* subsequently in the following capacities: Elected a member of the College in 1848, and a member of the Board of Trustees in the same year; elected secretary of the College on May 25, 1850; serving twenty-one years in this capacity, he then became corresponding secretary, holding this office until 1886. He was thus a secretary of the College for *thirty-six* years. He also served on the Publication Committee of the AMERICAN JOURNAL OF PHARMACY for twenty-one years, beginning in 1850. In 1887 the College conferred upon him the honorary degree of Master of Pharmacy. But of all the services he rendered Pharmacy, none have been of such enduring value as those upon the Committees of Revision of the U. S. Pharmacopœia. He was a member of the Committee of Revision of the College for the Pharmacopœias for 1860, 1870, 1880 and 1890, and president of the College Committees in 1880 and 1890. Of all pharmacists he undoubtedly has to his credit the greatest number of years of uninterrupted service upon the National Committee of Revision, having acted continuously from 1860 until the time of his death, a period of *thirty-seven* years. He was the secretary of the National Committee for the 1860 and 1870 revisions of the Pharmacopœia, and during these years his position as editor and secretary required continuous and laborious duties involving critical experiments, recording and reconciling the views of the members of of the Committee, and, finally, correcting the proofs and making the business arrangements for the books.

In practical pharmacy he was the first to propose the use of cacao butter as a basis for suppositories, and in 1859 he wrote a masterly

report on weights and measures, and developed in a most able manner, the value of the octonary system, with an entirely new plan for weights and measures, which will be found in the *Proceedings* of the American Pharmaceutical Association for 1859. A good mathematician, with an accurate knowledge of ancient languages, a forcible writer of English, with a correct knowledge of etymology, it will be seen that he was admirably equipped for his great work on the Committee of the Revision of the Pharmacopœia.

In the *American Journal of Pharmacy*, and in the *Proceedings of the American Pharmaceutical Association*, will be found many contributions from his pen. A review of these will exhibit his versatility.

CONTRIBUTIONS TO PHARMACEUTICAL JOURNALS, ETC.

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1850, AMERICAN JOURNAL OF PHARMACY, Vol. 22, p. 370, Reviews: "Booth's Encyclopedia of Chemistry."

1851, AMERICAN JOURNAL OF PHARMACY, Vol. 23, p. 186, "Patent Medicine Tax."

1852, AMERICAN JOURNAL OF PHARMACY, Vol. 24, pp. 34, 35, "Jackson's Syrup."

1852, AMERICAN JOURNAL OF PHARMACY, Vol. 24, p. 33, "Jackson's Lozenges."

1852, AMERICAN JOURNAL OF PHARMACY, Vol. 24, p. 33, "Castillon's Powders."

1852, AMERICAN JOURNAL OF PHARMACY. Vol. 24, p. 211, "Suppositories."

1852, AMERICAN JOURNAL OF PHARMACY, Vol. 24, p. 33, "Syrup Iodide of Zinc."

1853, AMERICAN JOURNAL OF PHARMACY, Vol. 25, p. 206, "Fluid Extract of Serpentaria."

1853, AMERICAN JOURNAL OF PHARMACY, Vol. 25, p. 207, "Mitchell's Aperient Pills."

1853, AMERICAN JOURNAL OF PHARMACY, Vol. 25, p. 207, "Mitchell's Aperient Powders."

1853, AMERICAN JOURNAL OF PHARMACY, Vol. 25, p. 207, "Mitchell's Tonic Pills."

1853, AMERICAN JOURNAL OF PHARMACY, Vol. 25, p. 294, "Tincture Cinchonæ Ferrata."

1855, AMERICAN JOURNAL OF PHARMACY, Vol. 27, p. 407, "Cream Syrup."

1859, AMERICAN JOURNAL OF PHARMACY, Vol. 31, p. 18, "Elixir Cinchonæ."

1859, Proceedings American Pharmaceutical Association, Vol. 8, p. 107, "On Poisons."

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1860, AMERICAN JOURNAL OF PHARMACY, Vol. 32, p. 97, "Weights of the Pharmacopœia."

1861, AMERICAN JOURNAL OF PHARMACY, Vol. 33, p. 202, "Report on Suppositories."

1862, AMERICAN JOURNAL OF PHARMACY, Vol. 34, p. 326, "Imperial and Wine Measures."

1863, AMERICAN JOURNAL OF PHARMACY, Vol. 35, p. 401, "Review of U. S. Pharmacopœia of 1860."

1863, Proceedings American Pharmaceutical Association, Vol. 11, p. 212, "Preservation of Volatile Oils."

1864, AMERICAN JOURNAL OF PHARMACY, Vol. 36, p. 130, "Preservation of Volatile Oils."

1864, American Pharmaceutical Association Proceedings, Vol. 12, p. 206, "Preparations of Cinchona."

1864, American Pharmaceutical Association Proceedings, Vol. 12, p. 215, "Aqueous Extract of Jalap."

1865, Numismatic and Antiquarian Society Journal, October, "Golden Relics from Chiriqui."

1865, AMERICAN JOURNAL OF PHARMACY, Vol. 37, p. 50, "Cinchona Preparations."

1865, AMERICAN JOURNAL OF PHARMACY, Vol. 37, p. 119, "Weights and Measures"

1865, AMERICAN JOURNAL OF PHARMACY, Vol. 37, p. 219, "Aqueous Extract of Jalap."

Proceedings American Pharmaceutical Association, Vol. 13, p. 156, "Uses of Glycerin."

1866, AMERICAN JOURNAL OF PHARMACY, Vol. 38, p. 325, "Glycerin Prevents Apotheme."

1866, AMERICAN JOURNAL OF PHARMACY, Vol. 38, p. 326, "Fluid Extract of Rhubarb."

1866, AMERICAN JOURNAL OF PHARMACY, Vol. 38, p. 327, "Infusum Cinchinonæ Flavæ."

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1869, Proceedings A. Ph. A., Vol. 17, p. 390, "Fluid Extracts."

1870, AMERICAN JOURNAL OF PHARMACY, Vol. 42, p. 150, "Fluid Extracts" (Campbell).

1870, Proceedings A. Ph. A., Vol. 18, p. 103, "Fluid Extracts and Menstrua."

1877, AMERICAN JOURNAL OF PHARMACY, Vol. 49, p. 209, "United States Pharmacopœia and American Medical Association."

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1882, Proceedings American Pharmaceutical Association, Vol. 31, p. 393, "Stathmetic Estimation."

1883, AMERICAN JOURNAL OF PHARMACY, Vol. 55, p. 556, "Examination of Drugs."

1887, Proceedings American Pharmaceutical Association, Vol. 35, p. 599, Weights and Measures."

1887, Philosophical Society Journal, Vol. 24, No. 126, "Octonary Numeration."

1888, Western Druggist, p. 195, "Solids by Weight, Liquids by Measure and Definite Quantities in the Pharmacopœia."

1888, Western Druggist, p. 282, "Substitute for Teaspoon," etc.

1888, Western Druggist, p. 425, "Pharmacopœial Suggestions."

1889, Western Druggist, p. 12, "Specific Gravity."

1889, Western Druggist, p. 43, "Specific Volume."

1890, Proceedings American Pharmaceutical Association, Vol. 38, p. 4, "Inaugural Address."

1890, Western Druggist, p. 15, "Decimal Quantities of the United States Pharmacopœia."

1891, Proceedings American Pharmaceutical Association, Vol. 39, p. 3, "President's Address."

1892, Western Druggist, p. 85, "Percentage Solutions."

1892, Western Druggist, p. 188, "Percentage Solutions."

1893, American Druggist, Nov. 23, "Chemical Nomenclature of the United States Pharmacopœia, 1890."

During his busy pharmaceutical life Mr. Taylor found time to cultivate his taste for outside scientific and technical pursuits, and had a great fondness for making collections of various kinds. He was a member of the Academy of Natural Sciences, one of the founders of the Philadelphia Numismatic and Antiquarian Society, and a member of the Numismatic Society of New York. He was an industrious philatelist.

Mr. Taylor married Mary A. Yeager, September 2, 1852, by whom he had five children, four of whom died in early life. One son, Joseph Y., born in 1854, entered the drug business and, following in the footsteps of his father, graduated from the Philadelphia College of Pharmacy in 1875. Alfred B. Taylor married again in 1870, but had no children by this second marriage.

In private life he was always courteous, genial and kind, strongly attached to his friends and caring little for the applause of the world, he treasured most the attachments of those who were near and dear to him. Always modest, yet holding his views with remarkable tenacity, he labored unselfishly for the attainment of the highest ideals. In whatever department of science he was engaged, he ever sought the truth.

The last few years of his life were marked by periods of great suffering. In August of 1897 his eyesight failed greatly and he was thus denied one of his chief comforts, that of reading. A long continued attack of herpes zoster rendered him very weak, and this was followed by a return of a chronic inflamation of the bladder, to which he finally succumbed, closing his eventful life on February 28, 1898, in the 75th year of his age.

Thus has passed away one of the pharmaceutical masters who has enriched the profession by faithful, unremitting devotion to its best interests, and one whose name will ever be associated with the most notable achievements of American pharmacy.

ON THE ASSAY OF BELLADONNA PLASTERS AND THE ALKALOIDAL STRENGTH OF THE BELLADONNA PLASTERS OF THE MARKET.

By Carl E. Smith.

Report from Research Committee D., Section II., of the Committee of Revision of the U. S. Pharmacopœia.

The Belladonna Plasters of the American market are almost without exception prepared with a base containing rubber as the principal ingredient, combined with various resins. Moreover, they are often admittedly prepared from an extract of the rhizome of *Scopolia carniolica*, and in such cases are not "belladonna" plasters, strictly speaking. As, however, the alkaloids of this plant are practically identical with those of *Atropa belladonna* and are apparently present in more uniform quantity in it than in either the leaf or root of the latter, there would seem to be some excuse for the substitution.

METHOD OF ASSAY.

The presence of rubber necessitates some deviation from the methods of valuation, as applied to the ordinary galenical preparations of alkaloidal drugs and the most practical of the very few published methods, of which the writer has knowledge, proved to be that of S. W. Williams, Ph.C. and C. E. Parker, Ph.C., chemists for Seabury & Johnson. It is included in a comprehensive paper on belladonna plasters read before the A. Ph. A. at the meeting of 1890

(see *Proc.* A. Ph. A., 1890, pp. 155–173; *Pharm. Record*, 1890) At the suggestion of Prof. Virgil Coblentz, the writer called upon these gentlemen, who very kindly communicated their present process, which differs in important features from that published by them in 1890, and also offered to furnish any other assistance in their power. The writer takes much pleasure in acknowledging the valuable aid rendered to him by Mr. Williams and Mr. Parker.

The method, as obtained from the authors, has been deviated from in the writer's work only in minor details, and is in outline as follows: The plaster is cut in strips and the mass disintegrated and partially dissolved by stirring with chloroform made alkaline with ammonia water. The chloroform mixture is decanted and the cloth washed with successive small portions of chloroform. The rubber is precipitated from the chloroform with alcohol, the solution decanted and the rubber re-dissolved with chloroform and re-precipitated with alcohol repeatedly to recover any alkaloid retained in it. The alkaloid is washed out from the united alcohol-chloroform solutions with acid water, the acid solution of alkaloid made alkaline with ammonia and extracted with chloroform. After distillation of the chloroform the alkaloidal residue is titrated with acid.

This method was critically tested as to its degree of accuracy in the following manner. Extract of belladonna leaf was assayed by the "shaking out" process, 1·19 and 1·15 per cent. of alkaloid being obtained in duplicate estimations, by titration with $\frac{N}{20}$ acid. The extract was then mixed with twice its weight of a rubber combination, such as is used in the manufacture of belladonna plasters, and for which the writer is indebted to Mr. S. W. Williams. The mixture was then assayed by the above outlined method and yielded 0·393 and 0·377 per cent. of alkaloid, the amount calculated from the mean result of assaying the extract being 0·390 per cent. These estimations were made without use of heat, except in distilling the chloroform during the final stage of the process. A third determination, during which the lumps of plaster mass were heated with the alkaline chloroform on a water-bath for a considerable time, to hasten their disintegration, but otherwise conducted in the same manner, gave only 0·353 per cent.

Repeating the above experiment with extract of belladonna root, one part of an extract assaying 2·49 and 2·53 per cent. was

mixed with four parts of the rubber compound. The mass should assay 0·502 per cent.; the amount found was 0·493 and 0·500 per cent.

The incorporation of the extracts with the rubber mixture was accomplished by working them up together in the hands, pulling out, twisting, etc. This was continued until the mass had a perfectly uniform appearance. Small losses of one or the other ingredient, through adhering to the hands, were prevented by rubbing a very little petrolatum on the fingers from time to time. After admixture the mass was weighed and found to have suffered no change in weight through loss or gain of moisture. Disintegration of the mass, when in form of lumps, is very much slower than is the case with spread plasters. It was found best to drop it in small pieces *separately* into the chloroform, as otherwise the fragments reunite into one large lump, greatly retarding solution.

The above stated results indicating the method to be reasonably accurate and reliable, it was accepted as the best available for the valuation of commercial belladonna plasters containing rubber.

THE ASSAY METHOD IN DETAIL.

If the plaster to be assayed approximates the U.S.P. standard of strength, one plaster, or about 8 grammes of mass, is sufficient for each determination; if weaker, correspondingly more should be taken, if accurate results are expected. The quantities of solvents, etc., given are suitable for one plaster of ordinary size. Weigh the plaster after removing all cloth except that upon which the mass is spread, cut it into strips, and place it into a beaker of 100 c.c. capacity with 50 c.c. of chloroform and 10 drops of 10 per cent. ammonia water. Stir with a glass rod until the mass is entirely removed from the cloth, which usually requires five to ten minutes. Heating is unnecessary and is apt to cause loss of alkaloid by saponification. Decant the chloroform mixture into a beaker of similar size and add to it 40 c.c. of 91 per cent. (by weight) alcohol. Stir gently until all rubber has separated in compact form, then leave it undisturbed for a few minutes and pour off the supernatant liquid into a separator of at least 250 c.c. capacity. Wash the cloth in the first beaker with 25 c.c. of chloroform and 5 drops of ammonia water, decant the washings into the second beaker, and redissolve with them the precipitated rubber. Stir this mixture until it is perfectly free from

lumps, then precipitate the rubber by addition of 20 c.c. of alcohol and proceed as before, adding the chloroform-alcohol solution to that in the separator. Repeat this procedure once more or until all mass is removed from cloth and beaker. Dry the cloth at a low heat, cool, and weigh it. The chloroform-alcohol solution is of a light-yellowish or brownish color, the depth of color depending mainly on the proportion of extract of belladonna (or scopolia) present. If the plaster contains leaf extract, the solution is, of course, green. It is nearly always more or less turbid from minute particles of rubber held suspended, which do not settle to the bottom except upon standing for some time. This suspended matter separates out during the next stage of the process and introduces complications. Filtration is impracticable, as the filter soon becomes covered with an impervious layer of rubber. When the chloroform mixture and alcohol are shaken vigorously in a stoppered flask, instead of stirring in a beaker with a rod, the supernatant solution will, as a rule, be nearly clear, but a portion of the precipitated rubber will be in a light, flocculent condition, so that only a part of the liquid can be decanted without carrying a considerable quantity of rubber with it. The other plan was, upon the whole, considered the best, particularly as the presence of this small amount of rubber does not materially affect the accuracy of the method, but merely necessitates a little more care in the manipulation. The quantity depends to some extent on the proportion of alcohol used to precipitate the rubber from the chloroform. Although nearly all of the rubber is precipitated by a volume of alcohol one-half that of the chloroform, it was found that practically 4 volumes of alcohol are required to insure a maximum precipitation from 5 volumes of chloroform. When this proportion of alcohol is used, the rubber carried over into the next stage of the process is too small in amount to influence the result.

To the combined chloroform-alcohol solutions in the separator add 20 c.c. of water containing 2 per cent. of sulphuric or hydrochloric acid and agitate by a gentle rotatory motion and inversion of the separator during five minutes. Vigorous shaking causes emulsification. After complete separation of the liquids draw off the chloroform solution into another separator, together with any solid matter that may have separated during the agitation and collected at the line of contact of the two liquids. Pour out from the top into a third separator

or any other convenient receptacle the acid solution, which contains most of the alkaloid. Wash out the empty separator with 10 c.c. of water containing a few drops of dilute acid, draw the washings off into the second separator and agitate this as before. Draw off the chloroform-alcohol into the first separator and add the water solution to the first portion. If the contact-line of the two liquids is perfect, so as to permit a complete separation of them, only a third portion of acidulated water will be required to remove all alkaloid from the chloroform, notwithstanding the presence of a large proportion of alcohol; but if any considerable amount of solid matter collects at the line of contact, a fourth or even fifth portion will be necessary.

Make the combined acid solutions alkaline with ammonia-water and wash out the alkaloid in a separator with 3 successive portions of 20, 10, and 10 c.c. of chloroform, observing the same precautions to avoid emulsions as before. Wash the combined chloroform solutions with 10 c.c. of water to remove any adhering ammonium salts or other impurities drawn off with the chloroform, and after complete separation transfer the chloroform solution to a small flask. Agitate the water in the separator with 10 c.c. of chloroform and after separation add the latter to that in the flask.

Evaporate or distil off the chloroform. If distilled, great care must be taken that the tube and cork connecting the flask with the condenser are perfectly clean, as the estimation would be vitiated by the presence of even minute quantities of acids or alkalies. If the chloroform is to be evaporated, precautions are necessary, in view of the observations of Dieterich, that alkaloids may become partially neutralized by hydrochloric acid, which is formed through the action of the gas flame on chloroform vapors. It is advisable, therefore, not to conduct the evaporation in shallow vessels, unless it can be done through a source of heat not necessitating the use of a flame. It is considered safe, however, to evaporate on a water-bath over a gas flame, if the chloroform solution is contained in a flask having a narrow neck, and evaporation carried on rapidly by boiling.

To the alkaloidal residue add 4 c.c. of $\frac{N}{20}$ acid and agitate by rotation until all alkaloid is dissolved. This is not always easy to decide, as there is nearly always more or less of an insoluble resi-

due. This usually remains on the bottom of the flask as a semi-fluid layer, which may be brought in thorough contact with the acid by inclining the flask so that different surfaces of the residue are always exposed to the action of the acid. When the residue no longer visibly diminishes in size, agitate about 5 minutes longer, to insure perfect solution of all alkaloid. Solution should be effected in the cold, as heating with the excess of acid might partially saponify the alkaloid. Add 50 c.c. of neutral distilled water, then 0·5 c.c. of a 1 per cent. solution of hæmatoxylin in neutral alcohol, and add $\frac{N}{20}$ alkali until the color of the solution changes from yellow to a dull red. Subtract the number of cubic centimetres required from 4, multiply the remainder by 0·0145 (the $\frac{N}{20}$ factor for atropine and its isomers) and by 100, and divide the product by the net weight, in grammes, of the plaster mass taken for assay. To illustrate, a plaster weighing 12 25 grammes, with cloth, and the cloth weighing 3·55 grammes, requires 1·58 c.c. of $\frac{N}{20}$ alkali to neutralize the excess of acid, then :

$$\frac{(4 - 1{\cdot}58) \times 0{\cdot}0145 \times 100}{12{\cdot}25 - 3{\cdot}55} = 0{\cdot}404 \text{ per cent. of alkaloid.}$$

The separated alkaloid is always too impure to admit of gravimetric estimation, and further purification entails too much loss for quantitative purposes. The impurities may, under certain conditions, also interfere in the volumetric estimation. If the alkaloid is dissolved with the aid of *alcohol* in the standard acid, the impurities will become diffused throughout the liquid, making a very turbid solution. Under these conditions the endreaction is not sharp. The change of color is not simply masked, as the impurities are nearly always of a light color, but, in some way not understood, they prevent a decided change of color until a considerable excess of alkali has been added. A rapid and convenient mode of dissolving the alkaloid for titration is the addition of about 0·5 c.c. of chloroform at the time of adding the standard acid. The chloroform dissolves a portion of the impurities and admits of a rapid solution of the alkaloid in the acid, at the same time leaving the acid solution practically clear. The endreaction is then quite sharp, but the red color

partially fades upon shaking, as the liberated alkaloid is taken up by the chloroform. If this is not kept in mind, the neutral point may be overstepped. The endreaction should be placed at the point where the color changes throughout the liquid, although it may disappear after further shaking or stirring.

ASSAY OF COMMERCIAL SAMPLES.

Eleven samples, comprising the products of six manufacturers, were obtained, with the double purpose of testing the general applicability of the assay method and to learn the alkaloidal strengths of the various plasters offered in the market. All prominent American manufacturers are represented, and one foreign plaster is included. The plasters were all purchased in the open market. The results given in the appended table fully corroborate previous statements to the effect that a great variation in strength exists. Only three samples in the list, all of them the products of one firm, conform to the U.S.P. standard of strength; all others are much below it.

The assay scheme, as detailed in the preceding pages, was found suitable for all plasters of American manufacture, but a modification was required for the foreign sample. That portion of it insoluble in the mixture of chloroform and alcohol could not be made to agglutinate, even on the addition of a large quantity of rubber dissolved in chloroform. The most uniform results were obtained by making the chloroform-alcohol solution up to a definite volume and filtering an aliquot part of it. In other respects no change in the method was required.

All porous plasters examined were uniform in square measure, 5x7½ inches, and in the table the average weight of the mass in one plaster is given, except in the cases of plasters put up in rolls.

No.	Per Cent. of Alkaloid in Mass.	Weight of Mass in One Plaster, in Grammes.
1	0·586; 0·594; 0·587; 0·571.	8·55
2	0·407; 0·403; 0·400; 0·416.	8·7
3	0·509; 0·497.	——
4	0·112; 0·108.	8·65
5	0·103; 0·110.	——
6	0·060; 0·058.	8·2
7	0·084; 0·081.	7·35
8	0·125; 0·116.	3·25!
9	0·098; 0·101.	8·35
10	0·042; 0·047.	5·7
11	0·095; 0·093; 0·096.	——

All samples responded readily to Vitali's test for solanaceous alkaloids except No. 11, the foreign sample, which failed to do so, probably through presence of some interfering impurity not removed by ordinary means. The alkaloid separated from it, however, showed a feeble midriatic effect on the eye of a cat in a dilution of 1 in 12,000. This plaster differs from the others also in other respects. It contains very little rubber, although stated to be "India rubber plaster." While all others are black, it is light-brown, although it is evidently made from leaf extract, judging from the presence of chlorophyll. Only one other of the number examined, No. 2, was made from the leaf extract.

As will be seen from the table, the plasters are not all spread with uniform thickness. No. 8, although containing twice as much alkaloid as No. 6 on the basis of the mass, actually contains less than the latter on the basis of square measure.

The work comprised in this paper was undertaken at the instance of Dr. Charles Rice and Dr. Virgil Coblentz, to both of whom the writer is much indebted for valuable aid and suggestions.

PHARMACEUTICAL LABORATORY OF THE NEW YORK COLLEGE OF PHARMACY, March, 1898.

ANALYSIS OF THE RHIZOME AND ROOTLETS OF PLANTAGO MAJOR, LINNÉ.

BY J. FRANK STRAWINSKI.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy, No. 175.

The results of an analysis of the leaves of this plant were published by Mr. Rosenbaum in the AMERICAN JOURNAL OF PHARMACY in 1886.

The proximate analysis of the rhizome and rootlets described herein was undertaken with the view of adding to the results of the foregoing work, and of contributing to the knowledge of the constituents of this well-known plant.

The rhizome and rootlets used in the work were collected from wild-growing plants by the writer. The two parts were carefully separated, cleaned and dried. The relative proportions of the two parts as they occur in nature are 30·5 of rhizome and 19·5 of rootlets.

It was assumed that the two parts lost the same amount of water upon drying, and they were subsequently mixed in the given proportions for the analysis. This was conducted according to Dragendorff's method.

Petroleum ether dissolved ·57 per cent. of the material. The extract was of waxy consistence and had a greenish-yellow color. It was solid at ordinary temperatures, but melted on the boiling water-bath. The extract consisted of caoutchouc, wax and fatty matter. The extract was treated with hot alcohol, the clean solution filtered off and allowed to evaporate. In about a week's time, when the alcohol had evaporated, stellate groups of crystals were noticed in the semi-solid residue of fatty matter. The writer hopes to be able to further investigate these crystals in the future.

Ether extracted ·41 per cent. of the rhizome and rootlets. The extract was of a dark amber color, and it only partly melted when placed on the water-bath. Warm water applied to the extract was found to have acquired a faint acid reaction. The water solution contained small quantities of glucose and a substance behaving like protocatechuic acid. Negative results were obtained for alkaloids and glucosides. That part of the extract insoluble in water was chiefly wax. This wax was insoluble in aqueous potassium hydrate solution, but soluble in alcoholic potassium hydrate solution.

Absolute alcohol was the next solvent applied. It removed 8·60 per cent. of red-brown extract. As the alcohol was being recovered from the extract a precipitate formed. This would not re-dissolve in the supernatant liquid or in absolute alcohol. But water completely dissolved the precipitate with the production of a "purple of Cassius" color. Hydrochloric acid produced no precipitate in this solution, but it caused the color to become paler. Ferric chloride imparted an olive-green color to the solution, but gave no precipitate. Sodium carbonate added to the last test produced a red color. These reactions probably indicate a phlobaphene or traces of protocatechuic acid. A fresh portion of the solution gave a yellowish precipitate with lead acetate. Glucose was found to the extent of 1·61 per cent., and, after boiling the solution with sulphuric acid, ·87 per cent. of saccharose was found.

Water was put upon the residue from the treatment with absolute alcohol, but unfortunately the material underwent fermentation. For this reason the remainder of the analysis cannot be looked upon

as representative of the original material; still, mention will be made of the proximate principles found. The water solution contained mucilaginous, but not albuminous matter precipitable by alcohol. Alkaline water also extracted mucilaginous matter.

Acidulated water dissolved pararabin substances and phosphates.

A special examination for tannin was made of some of the mixture of rhizome and rootlets by treating a portion with water, but the reactions were not sufficiently characteristic to indicate more than very slight traces of tannin, phlobaphene or allied substances.

Starch was shown to be present by both chemical and microchemical examinations.

The drug was found to contain 6·92 per cent. of moisture.

The ash amounted to 24·70 per cent. It was of a reddish-brown color, but a small quantity of it was soluble in water. A qualitative analysis of the ash revealed the presence of aluminum, iron, magnesium, manganese and potassium as chlorides, phosphates and sulphates.

HYGIENE OF THE TEETH.

By Clement B. Lowe, M.D.

It is related of Don Quixote de la Mancha, that after one of his battles, in which, as usual, he was defeated, he found himself lying upon the ground rubbing his bruises and bemoaning the loss of one of his molars, which had been knocked out by a large stone. He sagely remarked, after reflecting for a while on the matter, that to lose a molar was like losing an old friend. As we do not value our friends at their full worth until after we have lost them, so it is with our teeth; and yet there has been a great improvement in the amount of care bestowed upon the teeth by the present generation.

It is stated that there has been a marked increase in the longevity of the human race during the present century, the addition to the term of life being stated at from ten to fifteen years. Various causes have been assigned for this increase, such as better dwellings, better food, increased attention to sanitation, shorter hours of labor and labor-saving machinery, a better knowledge of disease and the remedies for combatting it, all of which are probably entitled to share in the credit of the results achieved; yet, Lauder Brunton thinks that the "credit is really due to the dentists who supply

teeth to those who otherwise would not have them, so that people can continue to masticate their food for a very much longer time than before." He gives a striking illustration of the value of mastication as follows: "I had an old pony which was beginning to show signs of decay, due, I thought, to old age. The stableman noticed that the oats were passed undigested through the pony, and he proposed that his food in future should be ground and made into a mash. This was done, and the pony at once became ten years younger and went on perfectly without further indication of age." The proper mastication of the food is one of the most important links in the chain of digestion; the lack of it one of the most fruitful causes of indigestion. Sir Andrew Clark made his patients count their bites. "The rule is, the mouth contains thirty-two teeth, so that to every mouthful of animal food you must give thirty-two bites in order that every tooth shall have a chance. If the food is at all tough, you must double the number and count sixty-four."

The proper development of the teeth in the young depends upon their receiving the proper food. This for infants is, of course, the mother's milk, which contains all of the salines necessary, providing the mother is herself properly fed. This is not always the case, and the drain of earthy phosphates may be so great in the pregnant female or nursing mother that she may complain of toothache or of her teeth dropping away, and there is a proverb which says "For every child a tooth." The administration of the syrup of calcium lacto-phosphate would be of great value in such cases. Some of our poor teeth may be directly chargeable to the character of the flour, which by fine grinding and repeated bolting has been deprived of much of its gluten and phosphates, and consists largely of fine starch. Bread of Graham flour which comprises the whole grain would be more healthful. The Scotch have shown wisdom in sticking to their oatmeal.

The eruption of the teeth is a critical period in the life of many an infant. A tooth at this time has not reached its full development, the fang has a sharp edge which, by the downward pressure of the resisting gum, presses the nerve against the bony process of the jaw-bone, making the pain suffered by these little ones far greater than is ordinarily supposed. Lancing the gums will often give instant relief, and is attended with little or no danger, provided the incision be directly down upon the tooth. The child suffers

but little pain, owing to the comparative insensibility of the gums, and will frequently allow it to be done without making any resistance. Strange to say, there is much prejudice on the part of mothers to the operation, and I have been told that if the tooth is not immediately erupted after the lancing the resulting cicatrix will be harder for the tooth to subsequently cut through. This is not the case; a cicatrix upon a mucous surface is less resistant than the original tissue. A lengthwise incision along the crown of an incisor or canine tooth is all that is necessary, but an X-shaped incision should be made for a bicuspid or a molar.

On account of their temporary character, parents often give but little care to the primary set of teeth. This is a mistake, as the character of the second set depends to a considerable extent upon that of the first. The first teeth contain more animal matter and larger pulp cavities than the permanent ones, and hence are more liable to decay. How frequently the first teeth present themselves as an unsightly, decayed row, whereas decay should be an exception and not a rule. If the teeth fall out too soon, the proper contour of the jaw may be interfered with; if they remain too long they may interfere with the eruption of the permanent teeth, causing irregularities in their alignment.

The most of people recognize the importance of cleaning the teeth daily, but many think that once is sufficient, and the best time the morning. The facts are that a quill toothpick should be used after each meal and the mouth thoroughly rinsed; a more thorough cleansing with brush and alkaline tooth powder should be given before retiring. The necessity for this care is evident if we know that the particles of food which collect between the teeth, on account of the warmth and moisture present, rapidly decay, render the breath offensive and promote the decay of the teeth. The so-called "tartar," which is largely a deposit from the saliva, also frequently does much harm, collecting principally upon the lower incisors. Candies and other forms of sugar are especially injurious if they become lodged in the crevices of the teeth, as they undergo an acid fermentation which attacks the enamel.

Tooth brushes should not be too large or too stiff, and should have the bristles projecting in different lengths. When first used it should be in an up-and-down manner, so as to remove the food remnants from the interstices of the teeth. The daily use of tooth

powders containing pumice stone, charcoal or other gritty substances will injure the enamel; charcoal should be especially condemned, as it cannot be ground into an impalpable powder, and its continuous use causes the gums to assume a tatooed appearance. Strongly alkaline soaps or tooth washes are also to be condemned. The best base for tooth powders is prepared (not precipitated) chalk; it is adhesive, gives sufficient friction and at the same time acts as an antacid. We generally add some powdered orris-root, which has a pleasant flavor and a favorable effect upon the gums. The addition of any considerable quantity of astringent, such as alum, krameria or cinchona, is not wise unless there be a marked vascularity of the gums. In conditions needing an astringent tooth wash, Dr. Jas. W. White suggests the use of equal quantities of tincture of krameria and eau de cologne. He thinks the use of the old standby, tincture of myrrh, of questionable value, as by its dilution the resin is deposited about the necks of the teeth, aggravating, rather than alleviating, the spongy conditions of the margins of the gums. He also suggests an excellent mouth wash for spongy and bleeding gums, viz.: Tannin, 1 drachm; potassium chlorate, 2 drachms; boiling water, 2 pints. In case acids have to be taken as a medicine, they should be largely diluted and taken through a glass tube, and the teeth afterwards brushed with tooth powder or with a solution of soda or magnesia. In case the gums recede a little, acids do special harm, as they attack the dentine below the enamel.

An aching tooth should never be extracted if possible to save it by treatment and filling, because not only is the tooth lost, but the opposing tooth in the other jaw loses its antagonist and has nothing to grind against, and may, therefore, rise beyond the line of the adjacent teeth; the pressure produced during mastication seems to be essential to the retention of the teeth in their natural positions. It is a wise thing, therefore, to frequently give a child a crust of bread to exercise its teeth upon, notwithstanding soft food may agree with it.

The proper material for filling teeth must be left to the dentist's discretion and the state of our pocket-books; it can be said, however, that generally the best material is gold. Few would be so foolish as the lady of fashion who had two small holes drilled in her upper incisors and diamonds inserted.

Various dental anodynes are in use, the principal ones being tincture of opium, oil of cloves, carbolic acid and cocaine; they all act by depressing the peripheral terminations of the sensory nerves, opium in addition imparing their conductivity. Carbolic acid and cocaine have also a local anesthetic effect. A caution should be given about the free use of cocaine, as various untoward effects depending upon some peculiar individual idiosyncrasy have been numerous of late. The drug in small doses is generally a heart stimulant, but sometimes acts as a heart depressant. Piscidia erythrina (Jamaica dogwood) in the shape of a saturated tincture is said to be also an excellent anodyne, it can also be given internally for its hypnotic effects. Experiments regarding it are desirable.

Dangerous hemorrhage after the extraction of a tooth is not frequent. In several cases I have been successful after others had failed, by the application upon moistened absorbent cotton of powdered subsulphate of iron (Monsel's salt) with continuous pressure. Sometimes the cavity is so great that there is no way of packing the cotton, in such a case pressure can be maintained by a piece of cork placed so that the opposing teeth rest upon it, the jaws being afterwards tightly bandaged. Monsel's solution is not so good a preparation as the salt. In a case that came to my notice, the solution was sold by a pharmacist with a caution as to its use; the caution was not regarded, and the customer's mouth and tongue were badly constringed and blackened. An angry interview, in which considerable damages were demanded, followed. A quietus was put on this by the pharmacist, who announced $1,000 for defense, but not one cent for damages, but he lost a customer whose long tongue did him all the damage possible.

FORMALDEHYDE.

By George L. Taylor.

Known also as formic aldehyde, formal, formalin, etc., is the gaseous oxidation product of wood alcohol. At a temperature of 20° C. this gas polymerises and by the reunion of two of its molecules forms para-formaldehyde; a white semi-solid body of a soapy consistency, soluble in water or alcohol.

An aqueous solution of this para-formaldehyde forms in part the commercial article. Another commercial product, trioxymethylene,

formed by the reunion of three molecules of formic aldehyde, is the base of the solid product used in the form of pastilles, or in powdered form as a disinfectant.

Preparation of Formaldehyde.—The process of the discoverer, Hoffman, consisted of passing the vapor of methyl alcohol, mixed with a certain proportion of air, through a tube of platinum heated to dull redness. The resulting gases were condensed in a flask, and in addition to the methyl alcohol, small quantities of formic aldehyde were obtained.

Various modifications of Hoffman's process were brought out by other investigators, but all experienced great difficulty in obtaining the final product in any considerable quantity, and all found that the results might be rendered null by the most minute variation of any one of the factors employed.

The principal difficulties encountered, were, first, the great danger of explosion caused by bringing the vapors of methyl alcohol in contact with incandescent metal. These explosions sometimes occurred in the oxidizing tube and sometimes in the tank containing the alcohol. A second obstacle was the difficulty of oxidizing a large amount of alcohol at one time.

The whole process of oxidation must be very carefully conducted and the proportion of air and methyl vapor admitted to contact with the incandescent material must be very carefully adjusted, as, if oxygen is not present in sufficient quantity, no change takes place, and the product obtained is methyl alcohol, and, if oxygen is in excess, the process is carried too far, and formic acid or carbonic acid is produced.

In an apparatus which I have designed for producing formaldehyde in commercial quantities, the methyl alcohol to be converted is contained in a circular steel tank, capable of resisting heavy pressures; in the bottom of this tank is placed a coil of copper pipe into which steam at a high temperature is admitted; by this means the alcohol in the tank is boiled, and the resulting vapor is confined until a pressure of 75 or 80 pounds is reached, when it is allowed to escape into an air-mixer. This mixer is so constructed that an exactly determined quantity of air can be intimately combined with the methyl vapors. From the mixer the combination of air and vapor passes with great force and velocity through a fine tube into the converter, which has been brought to a dull red heat.

This converter consists of two concentric copper tubes, the space between which is filled with broken coke or other material of a similar nature. The inner tube is finely perforated with many small holes. The alcohol vapor is admitted into this inner tube, and, escaping through the perforations, is oxidized by coming in contact with the heated coke and the copper surface of the outer tube.

The gases produced in the converter pass over into the condenser. This condenser consists of a cylindrical tank or receiver, which may be of copper; it contains a coil of copper pipe, through which circulates a refrigerating mixture capable of reducing the temperature in the tank to about 0° C., at which temperature formic aldehyde condenses into a clear, very mobile liquid, which boils at 21° C., and which polymerises at 20° C.

After undergoing certain processes of purification, enough water is added to form a 40 per cent. solution.

This solution is not, strictly speaking, a solution of formaldehyde, but of para-formaldehyde, as the pure formaldehyde polymerises the moment the temperature rises above 20°. It is this property which renders the addition of water or alcohol necessary.

Formaldehyde Pastilles.—Paraformaldehyde, dried in the presence of sulphuric acid, becomes less soluble in water. The insoluble part constitutes trioxymethylene, a white powder resolving by heat into pure formic aldehyde. This powder is pressed into pastilles and in that form used as an antiseptic and deodorant.

Analysis of Formaldehyde.—(1) To detect its presence. Trillat's method. An aqueous solution of aniline is obtained by dissolving 3 grammes of fuchsin or magenta in 1 litre of distilled water; mix in a test tube 20 c.c. of this solution with 20 c.c. of the liquid to be assayed. In the presence of formic aldehyde a very light cloud forms after several hours. This reaction is very delicate; by it formaldehyde can be detected in a solution of $\frac{1}{20000}$. In solutions of this attenuation, however, the reaction does not appear until after the lapse of several days.

The search for formaldehyde in alimentary substances is often futile, because it forms, with certain organic substances, combinations from which it cannot be separated.

Quantitative Analysis.—To a solution of 3 grammes of aniline in 1 litre of water is added, drop by drop, thoroughly shaking, from

1 to 4 c.c. of the solution to be tested, according to the presumed concentration. It forms a white cloud, which is finally precipitated. After forty-eight hours the liquid is passed through filter paper, the precipitate is dried at 40° C., and its weight determined. The corresponding quantity of formaldehyde will be given by equation.

$$C^6H^5NH^2 + CH^2O = C^6H^5N : CH^2 + H^2O.$$

The method employed by Dr. Laderle, Chief Chemist of the New York City Health Department, is based on the principle that ammonia and formaldehyde combine readily to form the compound hexamethylentetramine, according to the following reaction:

$$\underset{\text{Formaldehyde.}}{6CH^2O} + \underset{\text{Ammonia.}}{4NH_3} = \underset{\text{Hexamethylentetramine.}}{(CH_2)_6N_4} + \underset{\text{Water.}}{6H^2O}$$

From the amount of ammonia required to form this compound formaldehyde is calculated. An excess of ammonia should be used and the mixture allowed to stand for at least twelve hours; the excess of ammonia present is determined by means of sulphuric acid.

Method of Analysis.—Take specific gravity of the solution at room temperature.

Place 2 or 3 c.c., carefully measured, into a bottle with glass stopper; add 50 to 60 c.c. $\frac{N}{2}$ ammonia solution; shake well and let stand twelve hours, shaking occasionally. Then titrate with $\frac{N}{4}$ sulphuric acid, using coralline as indicator.

Calculation—c.c. of ammonia neutralized by formaldehyde equal c.c. of ammonia used, minus c.c. of sulphuric acid.

Then, per cent. strength of solution equal

$$\frac{2{\cdot}25 \times \text{c.c. ammonia neutralized by formaldehyde}}{\text{Grammes solution taken.}}$$

Uses of Formaldehyde.—Formaldehyde has been put to an almost endless number of uses in the arts and sciences, but it is its great value as a disinfectant and deodorizer that has brought it into such general notice. Early in its history it was noted that it possessed strong germicidal and preservative powers, and many forms of apparatus were designed in the attempt to render it available for the purposes of household disinfection. This would seem to be a very

simple problem, but in practice many difficulties were encountered; it was at first thought that it would only be necessary to evaporate a quantity of the solution in an open vessel placed over a heating-lamp in the room, but it was found that when the solution became concentrated by boiling, polymerisation occurred and paraldehyde was formed, thus rendering about 70 per cent. of the formaldehyde in the solution inert and unavailable. The same result ensued when formaldehyde was evaporated at room temperature.

Trillat demonstrated that when the temperature was raised to a point considerably above that of boiling water, all of the gas in the solution was given off and rendered available for disinfection. His apparatus consisted of a strongly-constructed autoclave made of copper and provided with a heating-lamp, pressure gauge and releasing valve. In operation the solution of formaldehyde was heated in the autoclave until a pressure of three atmospheres was attained, when the releasing valve was cautiously opened and the generated gas was conveyed by a small tube through the keyhole into the apartment. Satisfactory results were obtained with this apparatus, but its great weight, the length of time required for each disinfection, and its first cost and the expense of operation have prohibited its use in many large cities when a number of disinfections are made daily. Many lamps designed to generate formaldehyde directly from methyl alcohol have been brought out from time to time, but, owing to the extreme delicacy of adjustment required, and also to the fact that varying atmospheric conditions render constant changes in adjustment necessary, none have given satisfactory results or have succeeded uniformly in generating more than a very small percentage of formaldehyde.

About two years ago I was requested to design a small portable apparatus for house disinfection. The requirements were that it was to be inexpensive in first cost and in operation, and that it should be so simple in construction and operation that it could be readily understood by a person of average intelligence. After a number of partial failures, I have succeeded in designing this apparatus, which I think fills the requirements.

It consists of a copper reservoir capable of holding sufficient formaldehyde to effect ten or twelve disinfections; beneath this receiver, and connected with it by a tube, is a copper evaporating chamber; under this chamber is a powerful heating-lamp. In operation, the

lamp is lighted and this evaporating chamber is brought to a red heat, a valve controlling the opening of the tube from the receiver to the evaporating chamber is opened and the formaldehyde solution is allowed to trickle down in a fine stream into the heated chamber. It is then instantly vaporized, the intense heat breaks up the polymerised products, and the pure gas is delivered through the delivery-tube and is conducted into the apartment.

Dr. W. H. Park and Dr. Arthur R. Guerard made a long series of bacteriological tests to determine the apparatus best adapted for the use of the New York City Health Department.

These tests were very thorough and comprehensive; they proved that formaldehyde could be depended upon to produce thorough surface disinfection; that its use did not affect colors or metals in any way, and that the cost of disinfection was not greater than when sulphur was used.

In their published reports, many investigators have stated that they are unable to get satisfactory sterilization with formaldehyde. I have investigated many of these cases and in nearly every instance have found that the failure was not due to the lack of germicidal power in the gas, but because too much had been expected of it, and because the test organisms had not been freely exposed; one might think that a culture placed in an open test tube was freely exposed, but this has proved to be an extremely severe condition, as the gas is required to replace a closed pocket or cushion of air. The same objection can be held against the practice of exposing cultures in boxes with perforated sides or covers. Other experimenters have wrapped the cultures in filter paper, a substance which is practically impenetrable by the gas.

The method which has been generally adopted as being the most satisfactory and as giving the most uniform results is as follows:

Loosely twisted threads of cotton are steeped in virulent cultures of pathogenic, non-spore-bearing bacteria. These threads are dried and half of each thread is cut off and reserved as a check on the result. The other half is placed on a strip of sterilized paper and freely exposed for six hours to the action of the gas generated from six ounces of formaldehyde solution. The threads are then placed in tubes containing the medium best adapted for the growth of the organisms employed and kept in an incubator for from 46 to 70 hours. If, at the end of that time, a growth of the specified bacteria

employed cannot be detected, sterilization is presumed to be complete.

GRAY'S GLYCERIN TONIC COMPOUND.

By William L. Cliffe.

A preparation under the above title has recently been offered for sale in Philadelphia by a firm of New York office pharmacists. They claim proprietorship for it by a process peculiar to merchants of their class. It seems to the writer that it would be as proper for their enterprise to lay claim to the ownership of Huxham's Tincture or Jackson's Pectoral Syrup; they would be just about as able to prove their title. Gray's Glycerin Tonic Compound has been a regular article of stock among Boston pharmacists for years, and is very commonly prescribed. The original formula, as appended, was furnished by the well-known firm of Boston, Kelley & Durkee, several years ago, when a prescription for it, written in Boston, was presented to the writer for compounding:

Gentian root, No. 40	3¾ ounces Troy.
Sherry wine, q. s. to percolate	26 fluid ounces.
To percolate add:	
Extract of dandelion	4⅞ ounces Troy.
Glycerin	26 fluid ounces.
Dilute phosphoric acid	4⅞ fluid ounces.
Tincture of cardamon compound, Syrup of lemon, Syrup of orange peel, of each	6½ fluid ounces.

GLEANINGS FROM THE MEDICAL JOURNALS.

By Clement B. Lowe, M.D.

The following article is especially commended to the attention of the younger members of the pharmaceutical profession who in the exuberance of their spirits are frequently tempted to do likewise.

SELLING MEDICINE FOR TRICK PURPOSES AN ASSAULT AND BATTERY.

A conviction of assault and battery, in the case of State *vs.* Monroe, of most peculiar character, was affirmed by the Supreme Court of North Carolina, December 21, 1897. An individual, Will Horn, had administered to one Ernest Barrett a dose of croton oil, and the oil had an injurious effect upon Barrett. This led to the prosecution of the defendant, Monroe, for assault and battery. Mon-

roe admitted that he sold the oil to Horn, and at his request dropped it into a piece of candy, but denied that he knew that these parties were playing practical jokes on each other, and denied knowing for what purpose Horn wanted the oil. His guilt as a principal, not as an accessory, the court held, depended upon whether he knew, or had reason to believe, that the dose was intended for Barrett or some other person as a trick, and not for medicinal purposes. Upon the whole evidence he was found guilty. The instruction given to the jury that if the defendant knew or had reason to believe, and did believe, when he sold the oil, that it was intended for Barrett or some other person as a trick or joke, and not for medicinal purpose, the defendant would be guilty of assault and battery, also that it was not necessary that it should be a poisonous or deadly dose; but that it was sufficient if it was an unusual dose, likely to produce serious injury, the Supreme Court pronounces unobjectionable in point of law.—*The Jour. Amer. Med. Ass.*, February 26, 1898.

FOR IRRITABLE BLADDER.

℞.	Salol,		ʒij
	Tinct. hyoscyami,		ʒij
	Inf. buchu,	q.s. ad.	℥vi

M.—Sig.: One tablespoonful three times a day.—*N. Y. Med. News*, February 26, 1898.

SOME OF THE DANGERS SURROUNDING THE DAIRY.

The above is the title of an interesting paper by Dr. E. F. Brush, of Mt. Vernon, N. Y. He says: "Few people realize the menace which lies in the milk-supply of cities. Milk which is dangerous, and perhaps deadly poisonous, appears just as innocent, innocuous, and deliciously nourishing as the fluid that is so in truth.

* * * * * * *

"We are constantly searching for a specific remedy for scarlet fever and other often fatal diseases of childhood, while frequently permitting the bacterial cause of disease to be fed to our children in their milk.

* * * * * * *

"In these days of bottled milk the danger of spreading contagion is vastly increased. Bottles which go into rooms where children are suffering from any of the contagious diseases must be a source

of danger if not subsequently sterilized. Quite recently I had occasion to visit a man who did a large bottled-milk business in New York City. The milk came in wagons from the upper part of Westchester County, and he had a horse-stable half way between his source of supply and New York. Here his horses were changed. All the milk came to this stable in cans, and the empty bottles came back here to be washed. He had two wooden troughs in this stable, and a stove with a large kettle to heat water, and the bottles were washed here in lukewarm water with sal soda, rinsed with cold water, and then filled from the cans.

"I think, if some of us had followed these bottles around and had seen where some of them had been, we would have wanted them pretty well steamed and sterilized before we drank from them."—*N. Y. Med. News*, February 12, 1897.

TREATMENT OF ENURESIS.

Martin (*The Med. Press and Circular*, December 15, 1897) gave a boy, aged seven years, who for some months had been in the habit of wetting his bed three or four times each night, the following mixture:

℞.	Potass. bromid.,	ʒ ij
	Tinct. belladonnæ,	ʒ ij
	Tinct. chloroformi co. (B.P.),	ʒ i
	Aq. ad.,	℥ vi

♏.—Sig.: ʒ ss at 4 P.M. and a second dose at bedtime.

From the time when this was first administered there was no occurrence of the enuresis.

THE DEATH-RATE FROM TYPHOID FEVER.

In the last twenty years the typhoid death-rate in Germany has declined in successive five-year periods, per 10,000 living, in the following ratios: 6·17, 4·99, 2·78 and 1·86. During a similar period the typhoid death-rate of Philadelphia has not been reduced by one-half. In 1880 it was 58·7 per 100,000, and in 1896 it was 38·81. During thirty-six years ending December 31, 1896, the total number of deaths from typhoid reported in Philadelphia was 19,663. In 1892 the ratio of typhoid mortality to the general mortality was: in Philadelphia, 2·22; in Chicago, 2·64; in Boston, 1·22; in London, ·49, and in Berlin, ·42. We pay high prices for our "liberty and equality"—*i. e.*, for our bosses and our slavery.—*The Phila. Med. Jour.*, February 5, 1898.

AN OINTMENT FOR ENLARGED GLANDS.

℞. Ichthyol,
Ung. hydrarg.,
Ung. bellad., } āā ʒ i
Ung. petrolati, ℥ss

M. Ft. ung.—Sig. : Apply night and morning over the affected glands, using friction until absorbed.—*N. Y. Med. News*, February 19, 1898.

FOR ERYSIPELAS.

The intense burning pain is said to be relieved and the progress of the disease favorably influenced by the use of the following application :

℞. Aristol., gr. xx
Collodii, ʒ i

M.—Sig. : Apply freely with a camel's-hair brush over and slightly beyond the inflamed area. This should be renewed as it scales off.—*N. Y. Med. News*, February 19, 1898.

AN ABUSE OF MEDICAL CHARITY.

Last winter a man presented himself at the New York Ophthalmic Hospital and asked that an operation for cataract be performed, stating that he was very poor. The hospital is partly supported by charity. In view of the man's statement that he was unable to pay much, the physician in charge reduced the usual $15 per week to $5 per week for board and attendance. The man was admitted and stayed several weeks. It was then learned that he was senior member of a large grocery firm and was worth about $150,000. The hospital, therefore, presented a bill for $200, the full rates ; the man refused to pay ; the hospital sued, and received a verdict for the amount. Such vigorous treatment applied to a few of the many similar cases constantly recurring would have a beneficent effect upon the community.—*Annals of Ophthalmology.*

A VAGINAL ANTISEPTIC AND ASTRINGENT.

The Journal de Médecine de Paris for January 30th attributes the following formula to Lutaud :

℞ Alum,
Boric acid, } each, 900 grains.
Carbolic acid,
Oil of wintergreen, } each, 20 drops.

M.—A teaspoonful to be dissolved in a pint of hot water for a vaginal injection.

PILLS FOR NEURASTHENIA.

R.	Iron lactate,	2 drachms.
	Iron arseniate,	3 grains.
	Extract of nux vomica,	7 "
	Extract of gentian,	45 "

M.—Divide into a hundred pills. Two to be taken with each meal.—*Journal de Médecine de Paris.*

PROGRESS IN FORMALDEHYDE DISINFECTION.

For two years the Chicago Health Department has been investigating the claims made for formaldehyde as a disinfectant, with special reference to the practibility and value of its use for household or domestic disinfection. Every known form of formaldehyde disinfection has been tested during this period.

Under Dr. Gehrmann's supervision a simplified form of apparatus has been constructed, in which is used formalin diluted by the addition of three times its volume of water. The apparatus consists of a shallow granite-ware vessel, of half-gallon capacity, supported over a methyl-alcohol lamp capable of holding twelve to sixteen ounces of the wood spirits.

One pound of the formalin solution (40 per cent. of formaldehyde) contains approximately 200 grammes of formaldehyde, and, as from 30 to 50 grammes are sufficient for the disinfection of 1,000 cubic feet of space, one pound of the solution should be sufficient for the treatment of 4,000 cubic feet of space, providing all the formaldehyde can be vaporized. In practice the experiments thus far conducted show that by diluting the ordinary solution with three times its volume of hot water, and then boiling for half an hour, from 40 to 50 grammes of the gas will be disengaged, quite sufficient to disinfect 1,000 cubic feet of space.

The results have, indeed, been so satisfactory and the remarkable bactericidal properties of formaldehyde have received confirmation in such a practical manner through these experiments, that an inexpensive vaporizer (costing less than twenty cents) has been devised by Dr. Jaques, chief of the diphtheria corps, for use in the room occupied by a diphtheria patient during the case. This is furnished and used in all charity cases of diphtheria treated exclusively by the department.—*Journal American Medical Association*, February 19, 1898.

FOR PERTUSSIS.

R.	Tr. belladonna,	ʒ ss
	Phenacetin,	gr. lxxv
	Spiritus frumenti,	ʒ iv
	Extract. castaneæ fld.,	℥ ii

M.—Sig.: To a child over one year of age administer ten drops every two to six hours; for a child of ten years the dose is one teaspoonful.—*New York Medical News*, February 19, 1898.

RECENT LITERATURE RELATING TO PHARMACY.

THE VOLATILE CONSTITUENTS OF THE WOOD OF GOUPIA TOMENTOSA.

W. R. Dunstan and T. A. Henry (*Proceedings of the Chemical Society*, London, March, 1898), state that Goupia tomentosa is a large tree growing in British Guiana, where it is known as "kabucalli." The wood is hard, and is used in the colony for boat-building. When freshly cut it emits a smell resembling that of valerian. By distilling the wood with water, a mixture of acids of the acetic series was obtained, from which the authors have isolated and identified formic acid, isovaleric acid, normal capric acid and lauric acid. A small quantity of succinic acid was also obtained.

SOLUBLE STARCH.

According to Wiktor Syniewski (*Ber.*, 1897, **30**, 2415–2418) soluble starch may be obtained by the action of a 9 per cent. solution of sodium peroxide on potato starch suspended in water, and is purified by repeated precipitation by alcohol, when it forms a snow-white amorphous substance which is almost free from ash; this has the composition $3C_6H_{10}O_5 + H_2O$, is soluble to the extent of 12·5 per cent. in cold water, and in all proportions in hot water; the aqueous solution is not altered by warming on the water-bath, and is colored a pure blue by iodine. The compound is dextrorotatory, but the specific rotation increases with the concentration of the solution. The yield is about 90 per cent. of the original material, the loss being purely mechanical.—*Journal of the Chemical Society*, London, February, 1898.

SOLUBLE STARCH AND DIASTASE.

In an investigation on the chemical constitution of diastase and the determination of its activity on soluble starch, A. Wroblewski has obtained results showing that in all preparations of diastase the

greater part of it consists of the inactive body arabin, and that diastase is a protein substance more resembling albumose than any other known proteid. Soluble starch can be prepared from starch either by boiling with water or with 2 per cent. potash solution; in the latter case acidulating and precipitating with 95 per cent. alcohol. Starch treated in this manner gave 50 to 60 per cent. of snow-white soluble starch, which dissolves to the extent of 3 per cent. in cold water, but is almost insoluble in 40 per cent. alcohol. Soluble starch is no doubt none other than the first product in the hydrolysis of starch. The action of alkalies on starch is similar to that of diastase, and alkalies, if slower, have greater hydrolytic power.—Hoppe-Seyler, *Zeits. Physiol. Chem.*, xxiv., 174, through *Pharmaceutical Journal*, February 19, 1898.

PHYSIOLOGICAL ACTION OF TANNIN AND GALLIC ACID.

Erich Harnack (*Zeit. Physiol. Chem.*, 1897, **24**, 115–124) reports that by administering to men or dogs small medicinal doses of tannin or gallic acid, the quantity of gallic acid in the urine is very small, but the greater amount is contained in the fæces. It is probable that some of the gallic acid which passes into the urine is decomposed, and traces of pyrogallol are found, if, in searching for it, the acidified urine has been evaporated; if the evaporation is omitted, pyrogallol is never found. Pyrogallol is highly poisonous, and is not formed in the organism.

On giving larger doses of gallic acid, more passes into the urine, especially if alkalies are given as well.

By feeding on free tannin none passes into the urine, but it is found after giving a freshly-prepared solution of tannin in alkali. For the isolation of tannin, the salting-out method by saturated sodium-chloride solution, and precipitation by solution of gelatin or albumin free from globulin, is recommended. The separation of small quantities of pyrogallol and gallic acid is only possible when the solubility of the former in boiling benzene is made use of.—*Journal of the Chemical Society*, London, February, 1898.

PREPARATION OF SOLUBLE STARCH AND STARCH SOLUTION.

Otto Foerster (*Chem. Zeit.*, 1897, **21**, 41) states that to prepare soluble starch a paste of 20 to 25 grammes of starch with water is poured in a thin stream into 200 to 300 c.c. of hot water containing

5 c.c. of concentrated hydrochloric acid, the liquid being stirred until it becomes homogeneous and fairly fluid; heat is then applied and the stirring continued until the liquid is clear and limpid as water. After cooling it is filtered, alcohol added to the filtrate, the precipitate which is formed washed with alcohol until free from chlorine, then with ether, allowed to dry in the air, and finally dried by gently warming, or, better, by allowing it to remain over sulphuric acid. To prepare a solution of starch, 20 grammes are dissolved as described above, the hydrochloric acid being carefully measured so that it may afterwards be exactly neutralized. The volume of the neutral filtered solution is made up to a litre by adding glycerol. The excess of water can be evaporated after the addition of the glycerol, whereby the stability of the solution is perhaps increased. Both these preparations give blue colorations with iodine.—*Journal of the Chemical Society*, London, February, 1898.

PERU BALSAM.

K. Dietrich has obtained authentic samples of Peru balsam from Honduras, which represent the pure natural product of the trees. The author distinguishes three qualities of the product, representing the first, second and third flow respectively, mixed with a few traces of bark. The three varieties differ from the commercial products by being much thicker, also much clearer and of darker color, and having a more intense balsamic odor. The author contradicts the usual supposition that the same tree furnishes balsam of the same quality, since the three samples examined showed different ester numbers. The balsams examined furnished 77 per cent. of aromatic bodies (cinnamein, etc.) and only 13 per cent. of resin ester, while the commercial products never have more than 65 to 75 per cent. aromatic substances. The proportion of cinnamein differs to the same extent, and the residue insoluble in ether was found to be 41·38 per cent., or 1·5 to 3 per cent. more than those of the commercial products. On this basis a balsam having less than 65 per cent. of aromatic substances and more than 28 per cent. of resinous matter should be considered as doubtful quality.—*Berichte d. Pharm. Ges.*, 1897, 437, through *Pharmaceutical Journal*, February 26, 1898.

DAVIESIA LATIFOLIA.

In a communication to the *Pharmaceutical Journal* in its issue of February 26th, Mr. J. Bosisto directs attention to this plant as

one worthy of investigation, and mentions that, in the districts where it abounds, its infusion has proved useful in the treatment of hydatids, low fevers, etc.

The plant is indigenous to Victoria, Australia, and belongs to the natural order Leguminosæ, suborder Papilionaceæ. It is a low-growing shrub, and is also known as the "Native Hop Bush," probably on account of its bitter taste.

The author states that a crystalline principle may be obtained by making an infusion of the leaves (and flowers when in season), concentrating to about one-half, and setting aside for crystallization to take place. After separation of the crystals, of which a further crop may be obtained by slight evaporation of the liquid, an oleoresin having a bitter taste remains.

A small amount of the crystalline principle was examined by Messrs. Paul and Cownley,[1] who report on it as follows:

"It was a bitter, neutral substance, readily soluble in hot water, crystalling out on cooling in the form of fine white needles, which were rendered anhydrous at 100–120° C. It was insoluble in ether, soluble in boiling chloroform and readily dissolved by weak alcohol, from which it was left as an amorphous residue on evaporation, but soon crystallized on the addition of a little water. It was soluble in caustic soda, and reprecipitated apparently unchanged by acids. On purification of the original crystals by recrystallization from water, the substance still retained its bitter taste and had a constant melting-point after having been dried at 120°. Fusion with sodium gave no indication of nitrogen. It did not reduce Fehling's solution until after hydrolysis by boiling with acid Its aqueous solution was precipitated by ammoniacal lead acetate, but not by neutral lead acetate."

As stated by Messrs. Paul and Cownley, these results point to this substance as being either a glucoside or sugar, but unless the persistent bitter taste could be eliminated by further purification, they are in favor of the former view.

These investigators hope to continue their study of the constituents of Daviesia latifolia when they obtain the leaves in sufficient quantity for the satisfactory extraction of them.

HYDROCINCHONINE.

Dr. Hesse has been further investigating hydrocinchonine, which was first obtained by Caventou and Willm by oxidation of commer-

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[1] *Pharmaceutical Journal*, February 26, 1898.

cial cinchonine sulphate with potassium permanganate. It has already been pointed out that hydrocinchonine naturally exists with cinchonine, and can be separated from it in several ways, whilst the cinchonine of Remijia purdieana has been found by Dr. Hesse to contain it in relatively larger quantity. The two mixed bases are best separated by converting them into platinum salts in a very slightly acid solution, so that the excess of hydrochloric acid does not exceed ¼ molecule of HCl, and removing the flocculent hydrocinchonine salt from the granular platinum salt of cinchonine. Hydrocinchonine was then obtained by treating the platinum salt with ammonia and recrystallizing from hot alcohol.

Hydrocinchonine melts at 268° to 269° C., and has a rotatory power of $[\alpha]_D = + 204{\cdot}5°$ in absolute alcohol at 15° C. The sulphate $(C_{19}H_{24}N_2O)_2H_2SO_4 \cdot 12H_2O$, and sulphates containing 9, 6 or 2 molecules of water have been obtained. They all lose the water of crystallization at 100° to 120° C. Hydrocinchonine sulphonic acid, $C_{19}H_{23}N_2O,SO_3H,H_2O$, was obtained by dissolving hydrocinchonine in sulphuric acid (1·84 specific gravity), allowing to stand forty-eight hours, adding water, and nearly neutralizing with ammonia. The greater part of the sulphonic acid separates out, and can be recrystallized from boiling water. Dr. Hesse differs in several instances from Skraup's work on hydrocinchonine, and also objects to Skraup substituting the name "cinchotine" for that body.—*Annalen*, 300, 42, through *Pharmaceutical Journal*, February 26, 1898.

ALKALOIDS OF LYCORIS RADIATA.

Morishima has isolated two alkaloids from Lycoris radiata—lycorine, precipitated by sodium carbonate from sulphuric-acid solution, and sekisanine. Lycorine, $C_{32}H_{32}N_2O_8$, forms large, colorless, polyhedric crystals, which turn yellow at 235° C., and decompose at 250° C. to a deep-brown resinous mass; they are barely soluble in water, sparingly so in ether, alcohol and chloroform. The solutions in acids give precipitates with the usual alkaloidal reagents. The gold salt is easily decomposed, and the platinum salt melts at 210°. $K_2Mn_2O_8$, in neutral solution, furnishes a brown precipitate, which is dissolved with a fine fluorescence by an excess of hydrochloric acid. The fluorescence is also produced by dilute bromine water. The hydrochloride, $C_{32}H_{32}N_2O_82HCl + 2H_2O$, crystallized from hot water in colorless, bitter, shining needles, melting at

208° C. It produces general paralysis on frogs, and death through paralysis of the heart muscles; on warm-blooded animals it gives rise to vomiting, diarrhœa, and, finally, collapse. No special influence is apparent on the arterial or respiratory organs. Subcutaneous injections produce no irritation. Sekisanine, $C_{34}H_{34}N_2O_9$, or $C_{31}H_{36}N_2O_9$, crystallizes from dilute alcohol in long, colorless, anhydrous columns, which are odorless and tasteless, melting at about 200° C. It is scarcely soluble in boiling water, sparingly in ether, chloroform and benzol, readily in alcohol. It is only partially precipitated from acid solutions by sodium carbonate and alkaline solutions, being soluble in excess of the latter. The platinum salt melts at 194° C. It gives no precipitates with the usual alkaloid reagents, and no fluorescence with bromine water, or $K_2Mn_2O_8$. Crystallized salts could not be obtained. Physiologically it is quite inactive.—*Chem. Zeit. Rept.*, xxii, 13, through *Pharmaceutical Journal*, February 26, 1898.

ASSAY OF GLYCEROPHOSPHATES.

A. Astruc has confirmed the view that calcium glycerophosphates in solution are alkaline to methyl-orange, and that they may be either acid or alkaline to phenolphthalein. To determine the amount of phosphoric acid present, he neutralizes a known volume of glycerophosphate solution with sulphuric or hydrochloric acid, with methyl-orange as indicator, then titrates the solution with standard alkali and phenolphthalein. In the equation representing the first reaction:

$$\left.\begin{array}{l} 2PO\left\langle\begin{array}{l} O \\ O \\ O-C_3H_7O_2 \end{array}\right. \!\!\!>Ca \quad + \; H_2SO_4 \end{array}\right\} = \left\{\begin{array}{l}(PO_4C_3H_7O_2)_2 \, . \, CaH_2 \\ CaSO_4\end{array}\right.$$

one molecule of mineral acid corresponds to two molecules of phosphoric acid, and in the second

$$(PO_4C_3H_7O_2)_2 \cdot CaH_2 + 2NaOH = (PO_4C_3H_7O_2)_2 \cdot CaNa_2 + 2H_2O$$

or,

$$\left.\begin{array}{r}(PO_4C_3H_7O_2)_2 \cdot CaH_2 \\ 2NaOH\end{array}\right\} = \left\{\begin{array}{l}PO_4C_3H_7O_2Ca \\ PO_4C_3H_7O_2Na_2 + 2H_2O,\end{array}\right.$$

one molecule of phosphoric anhydride corresponds to two molecules of soda. The quantity of phosphorus pentoxide in solution can thus be calculated, the results obtained being about 0 5 per cent. lower than those obtained by calcining a known weight of glycero-

phosphate, dissolving the ash in hydrochloric acid, and determining the phosphorus as magnesium pyrophosphate. The author concludes that the phosphoric acid in glycerophosphates can be determined very closely and rapidly by the method he describes; that the glycerophosphates of lime appear to decompose, even during heir preparation; and that undecomposed calcium glycerophosphate seems to require a quantity of acid equivalent to that of the soda necessary to act on phenolphthalein in order to react on methyl-orange.—*Journ. Pharm. Chim.* [6], vii., 5, through *Pharmaceutical Journal*, February 19, 1898.

ARROW-ROOT, CASSAVA AND KOONTI.

In the issue of the *Journal of the American Medical Association* for February 12th, appears a paper having the above title, by A. T. Cuzner, M.D.

Koonti.

The author, after considering the respective merits of arrow-root and cassava as sources of food, then gives an account of the third member of the group.

This plant (Zamia intregrifolia) is a native of South Florida, and is called "Indian Bread Root." In its foliage it bears a resemblance to the palm and tree fern. In affinity it is nearer the latter than the former. The accompanying figure represents the plant. Its root is the edible portion.

When the poor whites on the east coast are greatly in need of money they go to the woods and dig koonti, finding a ready market for the roots. Indeed, it is the sole occupation of many people. The roots are not cultivated, as they grow wild in abundance. A very fine quality of starch and tapioca is manufactured from them, which may be found at all times in the Key West market.

The starch cells of koonti are muller-shaped, like those of cassava, but smaller. The starch is said to be equal to the best Bermuda arrow-root, and lately its worth as an article of commerce has been fully recognized in Florida. There are a number of factories for its preparation in Southern Florida. A correspondent of the United States Agricultural Department writes: "I ate of a koonti pudding at Miami, and can say that, as it was prepared and served with milk and guava jelly, it was delicious."

The unique industry (in the more limited sense of the word) of the Seminole is the making of the koonti flour. The Indian process is this: The roots are gathered, the earth is washed from them, and they are laid in heaps near the "koonti log." The koonti log, so-called, is the trunk of a large pine tree, in which a number of holes, about 9 inches square at the top, their sides sloping downward to a point, have been cut side by side. Each of these holes is the property of some one of the squaws or children of the camp. For each of the holes, which serve as mortars, a pestle made of some hard wood is furnished.

The first step in the process is to reduce the washed koonti to a kind of pulp by chopping it into small pieces and filling with it one of the mortars and pounding it with a pestle. The contents of the mortar are then laid upon a small platform; each worker has one. When a sufficient quantity of the root has been pounded, the whole mass is thoroughly saturated with water in a vessel made of bark. The pulp is then mashed in a straining cloth, the starch of the koonti draining into a deer hide suspended below. When the starch has been thoroughly washed from the mass the latter is thrown away, and the starchy sediment in the water left to macerate. After some days the sediment is taken from the water and

spread upon palmetto leaves to dry. When dried, it is a yellowish white flour, ready for use.

In the factories this process is substantially followed, but with improved appliances, the chief variation being that the koonti starch undergoes several successive macerations, thereby making it purer and whiter than the Indian product.

The koonti bread made by the Indians is of a bright orange color. It is rather insipid, though not unpleasant to the taste. It is made without salt. Its yellow color is due to the fact that the flour has had but one maceration.

NEATSFOOT OIL.

J. H. Coste and E. J. Parry (*The Journal of the Society of Chemical Industry*, Vol. xvii, p. 4) state that very little information of a reliable character has been published concerning this oil. They attribute the deficiency to the difficulty in obtaining genuine samples. Therefore, in order to supply trustworthy data on this subject, the authors examined a sample (I) which was obtained through one of the most reliable trade sources, and two others (II and III) which they prepared themselves with special regard to details for obtaining the oil in a pure condition.

The following is a summary of their results:

	I.	II.	III.
Specific gravity, D $\frac{15·5°}{15·5°}$ C.	0·9163	0·9169	0·9174
Temperature rise with sulphuric acid (equal vols.)	51° C.	58° C.	56° C.
Viscosity at 140° F. (Redwood's viscosimeter)	74 sec.	70 sec.	—
" " 200° F. (Redwood's viscosimeter)	—	43 "	
Iodine absorption by Hübl's method	65·2 p. c.	71·1 p. c.	72·4 p. c.
Percentage of potash (KOH) for saponification	18·9	19·55 / 19·66	19·74
[1] Free acid (calculated as oleic acid)	—	Trace.	0·37
" (saturates KOH)	—	—	0·07
Insoluble fatty acids (by Hehner's method)	—	95·3	95·5

[1] Redetermined after keeping ten months: II, 0·14; III, 0·38.

The authors observe that the above figures show that the samples of known neatsfoot oil more closely resemble one another than they do the trade sample.

The fatty acids of these three samples were obtained by saponifying large quantities of the oil, washing with water and drying at 100° C. An analysis of these gave results as follows:

	I.	II.	III.
Specific gravity D $\frac{100^\circ}{100^\circ}$ C.	......	0·8742	0·8800
Iodine absorption	68·4	74·5	75·8
Percentage of potash (KOH) for neutralization	19·17	20·12	20·06
Mean combining weight	292	279	280
Solidifying point	—	—	26·1
Melting point	30° C.	29·2° C.	28·5° C.

In each case the fatty acids were nearly white, crystalline and almost odorless.

Of ten other samples of oil examined by the authors two agreed reasonably well with the pure samples already mentioned. One contained a considerable proportion of paraffin and the rest appeared to contain other mineral oils, with cotton-seed and probably linseed oil. The fatty acids of two of these samples were prepared, and, instead of being almost white, were decidedly yellow.

In discussing the subject of the paper, Mr. E. Grant Hooper said that sophistication of this oil was not only very common, but was also, in many cases, very gross in character. In a batch of eight samples recently brought to his notice, the following variations were observed, viz.: Densities from 0·9048 to 0·9196; saponification values (per cent. of potash), 5·64 — 19·9; iodine absorption, 46·5 — 86·7; acid (oleic), 1·20 — 6·20; refraction, — 3·6 to + 8·2, and one exceptional sample + 43·7. In glancing over the results obtained in the examination of about eighty samples during the year, he found that the acidity ranged from 0·39 to 34 per cent. (as olive seed); and, with reference to the refraction, the readings ranged from — 11 to + 7 and + 57.

Mr. Otto Hehner, in commenting on the above figures, said that they were interesting, but they did not furnish any contribution on the question of genuine neatsfoot oil. He desired to warn chemists against pinning their faith upon any particular number of constants worked out from a small number of samples. Experience invariably showed that the composition of all oils and fats varied considerably. Lard, for instance, showed wide differences, depending upon the feeding of the animals, the position from which the fat was taken, etc. He would have been interested if the authors had somewhat more closely examined the unsaturated portion of the oil, with a view to ascertain whether less saturated glycerides were contained in it than oleine.

EDITORIAL.

THE NATIONAL FORMULARY.

We are led to make some additional remarks on this subject by the recent appearance of "An Epitome of the National Formulary of Unofficial Preparations," compiled by the Cincinnati Academy of Pharmacy. Associated with this as part two is "The Academy of Pharmacy Formulary." The two make a small pocket volume of eighty-seven pages, handsomely bound in leather, and intended for distribution among the physicians of Cincinnati.

While this method of bringing the National Formulary to the attention of physicians is not new, it is, nevertheless, an excellent one. It has been suggested in numerous president's addresses before State pharmaceutical associations; it has been proposed time and again by members, but the actual carrying out of the plan has progressed slowly. Probably the Kentucky Pharmaceutical Association, in 1895, was one of the first to issue an epitome. The Pennsylvania Association appointed a committee in 1896 to exhibit National Formulary preparations at the meeting of the State Medical Association in 1897. According to the report of that committee (*Proc. Penna. Phar. Asso.*, 1897, p. 50) "they distributed 300 copies of an epitome of the N. F., and 2,000 samples," and the association appointed another committee to continue the work. The chairman of that committee, Mr. Stedem, has asked the Philadelphia College of Pharmacy to assist them. The invitation has been accepted, and a committee of the College appointed. We believe if this plan of issuing literature and samples be persistently advanced it will cause a better feeling between physicians and pharmacists. Some physicians are hoodwinked by the assertion that fine preparations can only be made on a large scale; some appear to be ignorant of any reasons against prescribing proprietary, trade-marked or patented preparations, and a few are too lazy to resist the agent of the proprietary goods, and order them from him or through their pharmacist out of sheer inability to resist him. Every pharmacist should become an active agent of the N. F. preparations.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

NOZIONI DI ZOOCHIMICA. Del Dott. Icilio Guareschi, Professore ordinario di Chimica Farmaceutica e Tossicologica nella R. Università di Torino. Unione Tipografico-Editrice, Torino, 1898.

The introduction to the book proper consists of a history of animal chemistry and its relation to chemistry in general; it also draws a comparison between the constituents of plants and animals and shows their relation. Practically all of the 271 quarto pages are devoted to the consideration of the subject under two parts as follows:

Part I. Substances constituting the animal organism.

Part II. Studies of the animal organs, tissues and liquids.

The first part begins with the elementary gases, water, mineral solids, and gradually leads up to the following classes of more complex compounds, viz.: Albuminoids and their derivatives; compounds nitrogenous, but not albuminous; non-nitrogenous substances, as the oils, sugars, phenols, lactic acid, etc.

The second part treats of the blood, tissues and bones, glandular secretions

urine and urine sediments, and finally animal concretions. The value of the whole work is enhanced by 125 well-executed illustrations, those of urinary sediments being especially noteworthy; in fact the whole subject of urine and its analysis is very fully considered.

This book is a valuable addition to the author's work on analytical chemistry noticed in this JOURNAL two months ago.

PROCEEDINGS OF THE AMERICAN PHARMACEUTICAL ASSOCIATION AT THE FORTY-FIFTH ANNUAL MEETING, HELD AT LAKE MINNETONKA, MINNESOTA, AUGUST, 1897.

The Proceedings appear this year without any startling novelties. The one part not touched on in this JOURNAL in the report of the meeting previously published is the Report on the Progress of Pharmacy. This year it is fully up to its usual standard of excellence. The introductory is particularly appropriate, and although the editor must have difficulty in adapting himself to the new order of things, he gives no hint of his troubles, but sets himself energetically about considering the various matters which have crowded into modern pharmacy, from "substitution" to the "new woman."

THE YEAR-BOOK OF TREATMENT FOR 1898. A critical review for practitioners of medicine and surgery. Lea Brothers & Co., Philadelphia and New York.

In this work of 484 pages will be found a valuable epitome of the year's progress in all branches of practical medicine. Not the least interesting is the Summary on Therapeutics, which is chiefly occupied with the consideration of new remedies. In treating of these the contributor has been conservative to a commendable degree. The toxic effects of some older remedies have received attention. The whole work is fully up to the high standard of its thirteen predecessors.

UEBER CHRONISCHE VERGIFTUNGEN MIT STEINKOHLENTHEERBENZIN; VIER TODESFALLE. Zusammgestellt von C. G. Santesson, Professor der Pharmacology in Stockholm. Reprint from *Archiv für Hygiene*, Bd. 31, Heft 4, 1898.

The increased use of benzol is the industrial arts has brought to light numerous cases of workmen suffering from the ill effects of the vapors; this is especially the case where the liquid is used as a solvent for rubber. Authorities are quoted to show that it must be considered an active poison, destroying the red corpuscles, causing irregular breathing, weak pulse and convulsions. The poison remains a long time in the body, is slowly oxidized, and passes off in the urine as sulphocarbolic acid.

A number of experiments on dogs are recorded, a close study of the action of the poison on the human subject has been made, and advice is given as to the best means of preserving the health of workmen who are engaged in manufactories where the vapor is liable to be present.

DER EINFLUSS DES ANTIPYRINS AUF CHININHYDROCHLORAT. Von C. G. Santesson. Reprint from the *Skandinavischen Archiv für Phyiologie*, Bd. 7, 1897.

The first notice of the influence of antipyrin on the solubility of quinine

hydrochloride was made by an Italian physician, Dr. Triulzi, in 1889. The solution found useful for hypodermic purposes is made as follows:

Quinine hydrochloride	3	grammes.
Antipyrin	2	"
Distilled water	5	"

The combination is known as "Chinopyrin," and in many ways chemically resembles both the constituents which compose it Dr. Santesson records experiments on frogs, dogs and the human subject. The results were favorable to the combination, not only because of the greater solubility imparted to the quinine salt, but also on physiological grounds.

Entwicklungsgeschichtliche Untersuchungen über den Malabar Cardamomen, und vergleichend anatomische Studien über die Samen einiger anderer Amomum-und Elettariaarten. Inaugural Dissertation, von Adolf Schad. Bern, Switzerland, 1897.

This work was carried out by the author at the Pharmaceutical Institute of Bern, under the direction of Professor Dr. Tschirch. In the introduction the botanical origin and the commercial sources of the cardamon is fully discussed, and an abundance of literary references quoted. This is followed by a section on the comparative anatomy and morphology of the most important ammomum and elettaria fruit. The most important commercial varieties are then considered. Three excellent plates accompany the text.

Experimental Untersuchungen über die Entstehung der Harzgallen und Verwandter Gebilde bei Unseren Abietineen. Inaugural Dissertation, von Peter Nottberg. Bern, Switzerland, 1897.

This, like the preceding, was conducted by the author at the Pharmaceutical Institute of the University of Bern, and under the direction of Professor Dr. Tschirch. It is the result of a series of investigations, and is accompanied by a number of excellent illustrations. No abstract can do it justice, and it should be studied in the original.

MINUTES OF THE PHARMACEUTICAL MEETING.

Philadelphia, March 15, 1898.

The regular Pharmaceutical Meeting was held in the Museum at 3 P.M., with Joseph W. England in the chair. The minutes of the previous meeting were allowed to stand as published.

A Faradic battery, such as was in use fifty years ago, was received from Mr. Howard B. French as an addition to the collection of the Museum.

Professor Trimble called attention to a peculiar form of crystallization of arsenous oxide. The formation was on the inner surface of a stock-bottle, and was only noticed recently. No examination had been made, however, to determine whether the beautiful etched-like appearance was in reality arsenous oxide or merely a marking on the surface of the glass. Professor Ryan exhibited a bottle having a quite similar appearance on the inner surface, which had never been used as a container at all.

Several papers were read, and the first was on the "Hygiene of the Teeth," by Dr. C. B. Lowe (see page 191).

In discussing the subject of the paper, Professor Trimble remarked upon the value of the solutions of eucalyptus gum for cleansing the teeth, and also upon their antiseptic and healing properties.

The chairman spoke in particular of the virtues of eucalyptus red gum as a local astringent.

The subject was continued by Dr. Lowe, who spoke of the efficiency of red gum tablets for relieving slight irritation of the throat.

The next paper was on the subject of "Formaldehyde," by Geo. L. Taylor, of New York (see page 195). In this the author considered the principles involved in the manufacture of formaldehyde from methyl alcohol, and then described apparatus which he himself designed for the manufacture of the solution on a commercial scale. He also exhibited and described apparatus designed for disinfecting apartments, the gas being generated from the commercial solution.

A question arose as to whether a person would be injured by remaining in a room undergoing disinfection, to which Mr. Taylor replied that, under the best conditions for disinfection, the atmosphere of the room would be unbearable.

A paper by William L. Cliffe, on "Gray's Glycerin Tonic Compound," aroused considerable discussion on the question pertaining to the sale of proprietary articles. Those taking part in it were Messrs. Stedem and Boring and Professor Ryan.

J. W. England read a note on a useful form of filter. It is made as follows: (1) Take a circular sheet of filtering paper and fold upon itself (following the first step of the older plan of plain cone filter), (2) open and infold at right angles to first fold; (3) open and take left and right sides of base of half circle and infold, forming a four-cornered star. Then press the corners of the star upon each other, so that there are formed two outer quarter sections of the sheet of filter paper, with two inner one-eighth sections; open and use. The filter is only of value for the collection and ready washing of small quantities of precipitates. F. G. Ryan stated that the filter had some advantages, and was first recommended, he thought, by the late Professor Bedford, in a paper in his journal, some few years ago.

An interesting part of the programme was a talk on quite a collection of spring flowers and plants by Prof. Henry Kraemer. Calling attention to a specimen of skunk cabbage, he said that the flowers are of biological interest on account of the structure. This he illustrated by diagram, and said that self-fertilization did not seem possible. Besides slugs, he believed that a kind of beetle is also instrumental in the fertilization of the flower. A peculiarity of the roots is the spiral structure of the older ones. Among the other specimens exhibited were iris, which Prof. Kraemer believed should be gathered at this season of the year; ground ivy, sassafras, which he thinks should also be gathered in the spring, pussy willow, poplar, alder, silver maple, white birch, chickweed, yarrow and elder; the latter apparently produces stolens like the strawberry, and thus may form quite a hedge.

He also called attention to a specimen of custard apple which had been grown from seeds sent to Mr. Howard B. French from Samoa.

In talking of plants Prof. Kraemer prefers the common names as being less confusing.

A conjoint vote of thanks was tendered Mr. Taylor and Prof. Kraemer for their respective courtesies.

On motion, the meeting adjourned.

THE PHILADELPHIA COLLEGE OF PHARMACY.

The following are the questions given to the First and Second Year classes at their recent examinations. Those on operative pharmacy, botany, analytical chemistry, and pharmacognosy were practical, and conducted in the respective laboratories, the others were written.

FIRST YEAR EXAMINATION, 1898.

THEORY AND PRACTICE OF PHARMACY.

A—(1) Name six liquids in the order of their value, which are used as solvents or menstrua in extracting the active principles of official liquid preparations. (2) Explain briefly the merits and limitations of each solvent or menstruum. (3) Illustrate by an official example the use of each solvent or menstruum. (4) State the advantages of sugar as it is used in liquid pharmaceutical preparations. (5) Why is honey used so seldom as a vehicle in official preparations. (6) What are the properties of acetic acid as a menstruum, and describe its advantages.

B—(1) Describe the official resins. (2) How do those which are not by-products differ from alcoholic extracts? (3) Give the general process for preparing this class of resins. (4) Are the resins found in plant-drugs always the active principles of the plant? (5) In making official extracts, explain how you may vary the yield of the extract.

CHEMISTRY.

C—(1) Write the chemical formulas of: Hydrogen Sulphide, Hydrogen Sulphite, Hydrogen Sulphate, Ferrous Sulphide, Sodium Sulphite, Calcium Sulphate. (2) Describe Hydrogen Sulphide, and state how it is prepared.

D—(1) What is *Carbo Ligni*, and how is it prepared, and what are its uses? (2) What is *Carbo Animalis*, how is it prepared, and what are its uses? (3) Describe the two oxides of Carbon, and state how you could distinguish between them.

MATERIA MEDICA AND BOTANY.

PHYSIOLOGY.

E—*The Blood.*—(1) Give the constitution of the blood. (2) How can the blood of human beings be told from that of fowls or fishes? (3) What is its coloring principle called? (4) State briefly the difference in composition of blood before and after coagulation. (5) What is the difference between blood and lymph? *The Heart.*—(6) State its normal size, and situation in the body. (7) Name the four cavities of the heart, and the four valves and their situations. (8) What are the names given to indicate the contraction and relaxation of the heart? (9) State briefly the systemic circulation. (10) Name the artery and its situation at which we can best feel the pulse. *The Lungs.*—(11) In what cavity are the lungs situated, and by what membrane are they surrounded? (12) Commencing above and proceeding downwards, name the parts of the respiratory apparatus. (13) State the number of respirations per

minute; how do they correspond with the pulse? (14) What do we mean by the "tidal volume" of air? (15) In the air we breathe, what per cent. of carbon dioxide (produced by respiration) is harmful to life, and how is it best detected?

BOTANY.

F—(1) What is the color of herb and leaf drugs when not properly dried? What is the cause? How prevented? (2) To what is the green color of essence of peppermint due? (3) What are galls? How are they produced? In what constituent are they particularly rich? On what plant are the official nutgalls produced? (4) Explain what you understand by the stigma and pollen grains of a flower? (5) Mention an official drug which consists of stigmas only. (6) Of what importance are pollen grains in the identification of drugs? (7) State briefly the characteristics of the flowers of the Compositæ. Give two drug examples. (8) What is a seed? What part of the seed is mace?

COMMITTEE.

G—(1) What chemical elements are present in Borax? (2) What is the official name of Borax? (3) From what source is Borax obtained, and in what localities is it found? (4) What acid is obtained from Borax? (5) Does this acid occur free in nature and where? (6) What is the best solvent for this acid? (7) What are its medical properties and uses? (8) Name an official preparation in which this acid and solvent are used. (9) Is this preparation a chemical compound or a solution? (10) What is Borax-glass?

H—(1) What is the effect of heat upon the organic principles of plant drugs? (2) Describe a method of extracting the soluble principles of plant drugs without the use of heat, as in making fluid-extracts. (3) In the official process for making extracts, how is the end of the process indicated? (4) What are powdered extracts? (5) Describe their advantages and disadvantages.

I—A customer desiring to provide himself with sufficient of the following mixture to last him during a sixty days' trip to Florida, requested the apothecary to furnish it:

℞	Hydrarg. Chlor. Corros.	gr. i
	Potass. Iodid.	℈ v
	Tr. Gentian. Comp.	f ʒ iv
	Syr. Stillingia Comp.	f ℥ ii
	Aqua Chloroformi, to make	f ℥ iv

M. Sig.—A teaspoonful three times a day.

Write out in full a formula for the quantity necessary for the trip.

K—Briefly describe what you understand by the following, and give drug examples of each: (*a*) Rhizome; (*b*) Simple Leaf; (*c*) Complete Flower; (*d*) Inferior Ovary; (*e*) Superior Ovary; (*f*) Follicle; (*g*) Capsule; (*h*) Inferior Drupe; (*i*) Cremocarp; (*j*) Albuminous Seed.

OPERATIVE PHARMACY.

Write your name and examination number on each label. Restore all containers to their proper places before leaving. Articles marked with an (*) *are weighed.*

(1) Granulated Salt.

* Ammonium Chloride	30 gm.

Purify and Granulate.

(2) Ointment of Mercuric Nitrate.

* Mercury	2·5 gm.
Nitric Acid	3· c.c.
Nitric Acid	2· c.c.
Lard Oil	30· c.c.

Make Ointment of Mercuric Nitrate by the official process.

(3) Suppositories.

Glycerin	8 c.c.
Sodium Carbonate	0·50 gm.
Stearic Acid	0·85 gm.

Make six suppositories, and put them in a small wide-mouth bottle.

PRACTICAL BOTANY.

(1)—*Stramonium Specimen.*—Describe the stem, leaf, flower, fruit and seed.

(2)—*Menispermum.*—Make sections and determine (*a*) whether root or rhizome; (*b*) monocotyledon or dicotyledon. Draw a diagram of the structure and indicate the tissues and their arrangements,

(3)—*Arrow-root.*—A sample purchased for arrow-root. Determine its purity and state whether you would accept or not. On what do you base your determination?

(4) - *Powdered Rhubarb.*—Determine its purity and state on what you base your determination.

SECOND YEAR EXAMINATION.

THEORY AND PRACTICE OF PHARMACY.

A—Ammonia Preparations.—(1) State briefly how Ammonia Water is prepared. (2) What percentage of Ammonia Gas is contained in each official Ammonia Water? (3) Name the ingredients in Aromatic Spirit of Ammonia. (4) How is Spirit of Ammonia prepared? (5) What decomposition occurs in Ammonium Carbonate when it is exposed to the air? (6) State how such a depreciated salt may be improved.

B—Products of Destructive Distillation.—(1) What official empyreumatic oleoresin is obtained by the destructive distillation of pine wood? (2) Name two official preparations of this oleoresin. (3) Give the official title of the volatile oil obtained from this oleoresin. (4) Describe the physical appearance of the residue left in the still. (5) What official empyreumatic oleoresin is obtained by the destructive distillation of the wood of a juniper? (6) What are its physical properties and medicinal uses?

C—Vinous Fermentation.—(1) What are the requisite elements in developing vinous fermentation in organic products? (2) How is Alcohol made? (3) How would you deprive Alcohol of its last 2 per cent. of water? (4) How is Alcohol freed from odorous products? (5) How is Ether made?

D—Volatile Oils.—(1) How is Oil of Bitter Almond made from bitter almonds? (2) What acid is found in such an oil? (3) How is Oil of Bitter Almond made synthetically? (4) What poor substitute is sometimes sold for Oil of Bitter Almond? (5) What is the dose of Oil of Bitter Almond?

E—Saponification.—(1) What is Soap? (2) What are the by-products resulting from the manufacture of Soap? (3) What is the official name and definition of Soap? (4) How are the finer grades of Soap perfumed? (5) What are the official preparations of Soap?

CHEMISTRY.

F—(1) What is the official name of "Bleaching Powder," and what is its formula? (2) Describe its manufacture. (3) Which is the more efficient bleaching and oxidizing agent, chlorine or bromine? (4) State the reasons for your opinion.

G—(1) What is "Plaster of Paris" and how is it made? (2) What is the chemical distinction between a "fat" lime and a "lean" lime? (3) What are the chemical differences between a common mortar and a cement?

H—(1) Describe the Metal Mercury and note its special physical properties. (2) Give the formula of the official chlorides of mercury and note their points of difference. (3) Do the same with the official oxides. (4) What valuable pigment have we among the mercury compounds?

I—(1) Describe the Metal Lead, noting its appearance and physical properties. (2) Give the official and common names of its most important official compounds. (3) What is the chemical composition of *Red Lead*, of *White Lead?* (4) What other well-known pigments besides these are there containing Lead?

K—(1) Enumerate the most valuable Ores of Iron. (2) How is the metal extracted commercially and what names do the several products bear? (3) By what test do you distinguish between Ferrous and Ferric compounds?

MATERIA MEDICA.

L—Alkaloids.—(1) Name two which are mydriatics. (2) Two which are myotics. (3) One which is a tænifuge. (4) Two which are antimalarial. (5) One (derived from a leaf drug) which is a local anesthetic. (6) One which is a powerful sialagogue and diaphoretic. (7) One (derived from a root drug) which is powerfully emetic. (8) One (derived from an umbelliferous fruit) which is poisonous. (9) One derived from an official tuberous root. (10) A yellow alkaloid obtained from a number of plants belonging to Ranunculaceæ and Berberidaceæ. *Doses.*—State the maximum dose of each of the following: (11) Strychnine. (12) Phyostigmine. (13) Digitalin (amorphous). (14) Digitalin (crystalline). (15) Pilocarpine. (16) Quinine. (17) Cocaine. (18) Belladonna Leaves. (19) Hyoscyamus. (20) Aconite.

M—The Cinchonas.—(1) Under what titles are they official? (2) Name the species from which each is derived. (3) Give the alkaloidal strength as required by the U.S.P. (4) Name their habitat, and the range of mountains on which they grow. (5) In what countries are they cultivated? (6) What is meant by the terms "mossed bark" and "renewed bark?" (7) State the principle modes of collection. (8) What per cent. of alkaloids do the cultivated

barks frequently yield? (9) State Grahe's test. (10) Which of the alkaloids give the green "thalleioquin" color with chlorine water and ammonia?

N—Roots, Barks, Leaves, etc.—Give the official names, botanical origins, natural orders, and habitats of each of the following: (1) Muskroot. (2) Pokeroot. (3) Blue Cohosh. (4) Cascara Sagrada. (5) Wahoo (6) Irish Broom. (7) Jaborandi. (8) Jimson Weed. (9) Henbane. (10) Foxglove.

O—Collection, Adulterations and Constituents.—(1) Taraxacum, what time of the year should it be gathered, and why? (2) What kind of digitalis leaves should be gathered? (3) What kind of belladonna root should be rejected? (4) What false Pareiras are sometimes seen in the market? (5) What is false Sumbul? (6) Is jalap better or worse for being worm eaten? State the reasons for your decision. (7) What rhizome is sometimes sold in place of spigelia? (8) What adulterations are seen in Alexandria senna? (9) Name the glucoside and enzyme present in bitter almond. (10) What action takes place between them in the presence of moisture?

P—Drugs Containing Glucosides, etc.—Give the official names, botanical origins, natural orders, and habitats of the drugs which contain the following principles: (1) Picrasmin; (2) Quinovin; (3) Convallamarin; (4) Jalapurgin; (5) Daphnin; (6) Gentiopicrin; (7) Salicin; (8) Santonin; (9) Cathartic Acid; (10) Daturine.

ANALYTICAL CHEMISTRY.

Each student was required to qualitatively determine the composition of a mixture of several salts. The substance was in the form of powder.

PHARMACOGNOSY.

A—Identify the following specimens. State exactly how you arrive at your conclusion. Draw the characteristic cell structures or cell contents. Give an opinion of purity: (1) Powdered anise; (2) Crocus; (3) Powdered red cinchona; (4) Powdered mustard; (5) Lupulin.

B—Name the following crude drugs with which are also microscopic sections: (6) Fennel; (7) Mexican sarsaparilla; (8) Hyoscyami folia; (9) Stramonii folia; (10) Belladonnæ folia.

Corundum in the United States.—The production of corundum in the United States in 1897 was 230 short tons, against 250 short tons in 1896. In each year the product was derived entirely from North Carolina, where the Hampden Corundum and Emery Company, which operates the Corundum Hill mines in Macon County, is the chief producer. Besides this concern, there were two small producers, namely, the Turkey Knob Corundum Company and the Savannah Mining Company. The conditions in the abrasive trade of the United States at the present time are such as to discourage the production of corundum here. At present prices it is doubtful if the mining of corundum in North Carolina can be carried on at a profit.—*The Journal of the Society of Chemical Industry*, January 31, 1898.

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COMPARATIVE ACCURACY OF TITRIMETRIC AND GASOMETRIC METHODS OF ESTIMATING HYDROGEN DIOXIDE IN PRESENCE OF VARIOUS PRESERVATIVE AGENTS.

BY CARL E. SMITH.

(Report from Research Committee D, Section II, of the Committee of Revision of the U. S. Pharmacopœia.)

The method of estimating hydrogen dioxide most extensively used is that of titration with potassium permanganate. Besides being more readily applied than any other, this method has always been presumed to give accurate results, at least sufficiently so for all practical purposes. Dr. Charles Rice, however, has observed that its accuracy is affected by the presence of glycerin, which some manufacturers add to the solutions to give them stability. A variety of other substances have from time to time been reported to be in use for the same purpose, and it was suspected that at least a part of them might also exert an influence on the results of the method. Such substances are boroglycerin, boric, salicylic and benzoic acids, acetanilid, salol, etc. It was important, therefore, to know if the inaccuracies introduced by the presence of glycerin or any other of the above enumerated substances are so great as to make the method worthless, and, if so, whether a method could be found that is not affected by these additions, one that could be relied upon under any conditions likely to occur in the assay of commercial solutions of hydrogen dioxide. It was the writer's task, for this pur-

pose, to make comparisons of the more prominent titrimetric and gasometric methods under such conditions as might be encountered in practice. The experiments were confined to four methods, a description of which will first be given.

Titrimetric Permanganate Method.—When a solution of potassium permanganate is gradually added, with agitation, to a solution of hydrogen dioxide containing sulphuric acid, the permanganate is decolorized through the formation of manganous sulphate, and all available oxygen is liberated from the hydrogen dioxide, together with an equal amount from the permanganate. When the last drop of the solution added leaves a permanent red color after agitation, the reaction is ended. It proceeds in accordance with the following equation:

$$5H_2O_2 + 2KMnO_4 + 3H_2SO_4 = 5O_2 + 2MnSO_4 + K_2SO_4 + 8H_2O.$$

If 1 c.c. of hydrogen dioxide solution is taken and a $\frac{N}{10}$ solution of permanganate used, the number of cubic centimeters required to produce a permanent red color, multiplied by 0·56, will indicate the number of volumes of available oxygen yielded by one volume of the sample.

Gasometric Permanganate Method.—The reaction made use of in this method is the same as in the preceding one, the principal difference being in the direct measurement of the liberated oxygen instead of its calculation from the amount of permanganate consumed. The operation is performed in a gasometer, or nitrometer, several forms of which have been devised. A description of the form best suited to this work and its use will be found in the Appendix of the U. S. P. of 1890, under "Gasometric Estimations," and in the Dispensatories. The writer operated in the following manner: The measuring tube, graduated to 100 c.c., is filled with a saturated solution of sodium chloride, 2 c.c. of the sample are accurately measured into the funnel tube and slowly let into the measuring tube, care being taken that no air is admitted. Ten c.c. of 10 per cent. sulphuric acid are then admitted in the same manner, and finally 20 c.c. of a 2 per cent. solution of potassium permanganate. When the reaction has nearly ceased, the tube is inverted a few times to insure complete decomposition of the hydrogen dioxide. This must be repeated several times within the

next five minutes, on account of the voluminous precipitate of hydrated manganese dioxide, which prevents small bubbles of gas from rising to the top. The tube is then placed in a vertical position, and, when the volume of gas becomes constant, the liquid in the equilibrium tube is adjusted to the same level as that in the measuring tube. The volume of gas is then read and the temperature noted. Since the standard of strength of hydrogen dioxide solutions is *not* based on the volumes of oxygen yielded at ordinary room temperature, but on the volume the gas would occupy at 0°C. and 760 millimetres barometric pressure, a correction is required for accurate determinations. The writer made correction for variation in temperature only, as sufficient for ordinary purposes. The reader is referred to the Pharmacopœia for the formula and tables required for this. It should not be omitted, as the error would be quite considerable. A solution yielding 10 volumes of oxygen at 0°C., would yield 10·55 volumes at 15°, 10·75 volumes at 20°, 10·9 volumes at 25°, etc.

In the writer's hands this method does not give very encouraging results. Duplicate estimations differ much more than with other methods, the precipitated manganese dioxide collects near the top of the liquid, and makes a close reading of the volume impracticable, besides obstructing the passage of gas bubbles. While not entirely worthless, it is much less satisfactory than the following method.

Gasometric Hypochlorite Method.—This method is recommended by D. B. Dott (*Ph. J. Tr.*, 1890 p. 833), who uses a solution of ordinary bleaching powder, also filling the apparatus with it instead of sodium chloride solution. Mr. Dott obtains appreciably higher results than by titrimetric methods, and concludes the method to be more accurate than the latter. The reaction is analogous to that of the permanganate methods, as follows:

$$Ca(ClO)_2 + 2H_2O_2 = 2O_2 + CaCl_2 + 2H_2O.$$

In some of the present writer's experiments a solution of chlorinated soda of approximately U.S.P. strength was used, in others a solution of chlorinated lime containing about 4 per cent. of available chlorine. Preference is given to the latter, as with the other a white, flocculent precipitate (probably sodium hydrate and carbonate) is formed, which is open to the same objections as that incidental to

the permanganate method. A saturated solution of sodium chloride was used in all cases for filling the gasometer. Two c.c. of the sample are admitted into the measuring tube, the funnel tube rinsed with a little water, this also let in and then 20 c.c. of the chlorinated lime solution added. From this point the procedure is the same as explained under the permanganate method.

With solutions containing in addition to hydrogen dioxide only small quantities of mineral acids and alkali salts, quite satisfactory results were obtained by this method, but in the cases of solutions to which any of the various preservatives had been added, there was a decided tendency, almost throughout, toward too low results. No appreciable error seems to be introduced through the solubility of oxygen in the liquid, above which the gas is collected, as no higher results were obtained when the liquid had previously been saturated with oxygen.

Titrimetric Thiosulphate Method.—This was first recommended by C. T. Kingzett (*Jour. Chem. Soc.*, 1880, Vol. 37, p. 802), and later by H. Thoms (*Arch. Pharm.*, 1887, Vol. 35, pp. 335–343). It is based on the fact that hydrogen dioxide liberates a definite quantity of iodine from iodides in acid solution, the iodine being titrated with sodium thiosulphate, in the usual manner.

$$H_2O_2 + 2KI + H_2SO_4 = I_2\,K_2 + SO_4 + 2H_2O;$$
$$I_2 + 2Na_2S_2O_3 = 2NaI + Na_2S_4O_6.$$

Thoms proceeds by warming 0·5 gramme of potassium iodide, 1 gramme of 20 per cent. sulphuric acid and 50 c.c. of water to 40° C., adding 0·5 c.c. of the hydrogen dioxide solution, shaking about five minutes, and titrating the liberated iodine with $\frac{N}{10}$ thiosulphate, then warming again to 40°, again titrating the appearing iodine, and repeating until no further liberation of iodine takes place. Carried out in this way the method is rather slow and tedious, requiring at least fifteen minutes for completion; but, since it was stated to be accurate, the writer decided to include it in his experiments, and found later, that by omitting the greater part of the water, so as to reduce the bulk of the solution to about 15 c.c. for the above-mentioned quantities, heating might be dispensed with, and the reaction would nevertheless be ended within five minutes. The final result was found to be the same, whether

working with dilute or with concentrated solutions. One possible source of error with the latter is that, when standing in a very warm room prior to titration, slight losses of iodine might occur through vaporization. This could, of course, be readily seen and proper precautions taken to prevent loss. The following mode of operation is considered the most practical: Dilute the solution to be tested to exactly ten times its volume with distilled water, measure 5·6 c.c. of the dilution (= 0·56 c.c. of sample) into a beaker or flask, add 5 c.c. of 10 per cent. sulphuric acid and 5 c.c. of a 10 per cent. solution of potassium iodide, and let the mixture stand for five minutes. Then gradually add $\frac{N}{10}$ thiosulphate, with constant agitation, until the color of the solution is discharged. If the solution remains colorless upon standing a few minutes longer, the titration is finished. If a color should appear, add sufficient thiosulphate solution to remove it. The total number of cubic centimeters of the thiosulphate solution required indicates the number of volumes of available oxygen the sample contains. If it is considerably stronger than ten volumes, the result will probably be too low, unless more time is allowed for the reaction. In such a case correspondingly more potassium iodide and sulphuric acid should be taken. No starch paste is necessary, as the endreaction is sufficiently sharp without it, particularly when the solution is placed over a white surface. In cases in which an accurate dilution of the sample is impracticable, 1 c.c. of the undiluted sample may be taken, with double the quantities of reagents given above. The number of cubic centimeters of $\frac{N}{10}$ thiosulphate required must then be multiplied by 0·56 to obtain the strength in available oxygen. Or, instead of $\frac{N}{10}$ thiosulphate (24·8 grammes of crystallized salt per liter), a solution containing 44·29 grammes per liter may be used. In the latter case each cubic centimeter consumed indicates one volume of available oxygen, provided 1 c.c. of sample has been taken. The per cent. of hydrogen dioxide is obtained by multiplying the volume strength by 0·3038. (This is not strictly correct, as the specific gravity of the solution is left out of consideration.) It is important that the reagents used are free from such impurities as would act as reducing or oxidizing agents.

The sulphuric acid should be free from sulphurous, arsenous and nitric acids, and the potassium iodide from iodate. Sodium thiosulphate (commercially called "hyposulphite of soda") is very frequently found in the market of a sufficiently high degree of purity to make it permissible to prepare the $\frac{N}{10}$ solution, for the assay of hydrogen dioxide, by dissolving exactly 24·8 grammes of it in enough distilled water to make 1 liter, instead of standardizing it with iodine. It should be in colorless, transparent, uneffloresced crystals, and contain no chloride or sulphate, or at most only traces of sulphate. The crystals should be coarsely powdered and any interstitial motherliquor removed by pressing between folds of bibulous paper before weighing. The writer, however, prefers to recrystallize the commercial salt and finds the solution prepared from this, in the manner indicated above, fully as accurate as when standardized with pure iodine.

This method has been treated of more at length than the others, because it proved to be the best of those examined, as will be explained more fully below.

Comparison of Methods on Commercial Samples.—A few commercial solutions of hydrogen dioxide of varying strength and purity were examined with the object of gaining some knowledge of the comparative accuracy of the four methods described. The pharmacopœial tests were also applied and the results embodied in the following table:

	Sample I.	Sample II.	Sample III.	Sample IV.
St'ng'h by $KMnO_4$ (titr.) method .	10·3; 10·35 vol.	15·45; 15·45 vol.	29·45; 29·35 vol.	26·65; 26·65 p c.
St'ng'h by $KMnO_4$ (gasom.) method	10·6; 10.3; 10·1; 10·4 vol.	15·5; 15·35 vol.	30·15; 31·6 vol.	27·85; 26·75 p.c.
St'ng'h by $Ca(ClO)_2$ method	10·45; 10·4 vol.	15·5; 15·55 vol.	29·7; 29 9 vol.	26·95; 27·2; 27·1 p.c.
St'ng'h by $Na_2S_2O_3$ method	10·3; 10·35 vol.	15·5; 15·55 vol.	29·4; 29·4 vol.	26·2; 26·4 p.c.
Acidity in cub.cms. of $\frac{N}{1}$ soda requ'd for 50 c.c.	1·85 c.c.	0·95 c.c.	2·1 c.c.	Neutral
Residue from 50 c.c. at 100° C. . .	0·339 gm.	0·029 gm.	0·124 gm.	0·015 gm. from 1 tube (3·025 gm.)
Impurities found .	HCl, $NaCl$, H_3PO_4	HCl, H_3PO_4	HCl, H_2SO_4, H_3PO_4	Not identified

No barium salts or fluorides were detected by the U.S.P. tests. The limit of acid (0·5 c.c. of $\frac{N}{1}$ soda for 50 c.c.) was exceeded in three samples. The limit of residue (0·25 grammes for 50 c.c) was exceeded in one. Nos. I, II, and III are aqueous solutions, stated to contain respectively 10, 15, and 30 volumes of available oxygen, while No. IV is an ethereal solution claimed to contain 25 per cent. of hydrogen dioxide. These claims as to strength are reasonably well supported by the results obtained. It will be seen that with some samples the results by the different methods vary more than with others, the differences being greatest in the case of Sample IV. Subsequent experiments showed the discrepancies in this case to be at least partially due to the presence of ether, and the fourth method to be the most trustworthy for the assay of ethereal solutions. The first, third, and fourth methods are fairly well in accord with each other, but the second frequently gave figures differing not only from those obtained by other methods, but also differing widely among themselves in duplicate estimations. This method, because of its seeming unreliability, was left out of consideration in later experiments.

Estimation in Presence of Preservative Agents.—In the experiments to be described, Sample II was used, as it proved to be the purest of the aqueous solutions at the writer's disposal. The mixtures were prepared by diluting 13·35 c.c. of this solution, containing 15·45 volumes of available oxygen, to 100 c.c. with distilled water, after adding a definite quantity of the substance whose influence on the methods was to be determined. Five c.c. of the dilution represent 1 c.c. of a solution of two-thirds the above strength, or 10·3 volumes. It was thought best to base the calculations on this latter standard of strength, as being the more customary one. The percentages given in the table below, of preservative substances added, were also based on this standard. In some cases these were added in the quantity that would be required to make a saturated solution in the amount of 10 volume solution present; in other cases much larger quantities were taken. The results are given in volumes of available oxygen.

Substances Added.	Permanganate Method, Titrimetric.	Hypochlorite Method.	Thiosulphate Method.
Glycerin, 5 p.c.	10·55; 10·45	10·2; 10·25	10·25; 10·25
Boroglycerin, 5 p.c.	10·45; 10·5	10·15; 10·05	10·25; 10·3
Boric acid, 5 p.c.	10·3; 10·25	10·3; 10·2	10·3; 10·25
Boric acid, 20 p.c.	10·3; 10·3	10·1; 10·15	10·3; 10·35
Salicylic acid, 0·2 p.c.	11·3; 11·5	9·6; 9·7	10·3; 10·3
Salicylic acid, 2 p.c.	15·0	9·55; 9·4	10·3; 10·4
Benzoic acid, 0·2 p.c.	10·45; 10·4	10·15; 10·15	10·45; 10·4
Salol, saturated solution *	10·25; 10·25	10·0; 9·85	10·2; 10·2
Acetanilid, 0·5 p.c.	10·3; 10·3	10·1; 10·2	10·25; 10·25
Ether, 10 p.c.	10·35; 10·35	10·65; 10·7	10·25; 10·25

* Prepared by diluting 13·35 c.c. of H_2O_2 solution with a cold, aqueous, saturated solution of salol to 100 c.c.

These results show that the accuracy of the titrimetric permanganate method is affected slightly by the presence of moderate quantities of glycerin or boroglycerin, but that in the presence of the quantities that would be added to the solutions by manufacturers, which would hardly exceed 1 per cent., the difference in result would not be noticeable. In presence of salicylic acid, however, the method is worthless. There is evidence also, that ether is not entirely without influence. It may be stated, then, as a generalization, that in presence of organic substances, titration with potassium permanganate cannot be depended upon to always give sufficiently accurate results for pharmacopœial purposes.

With the hypochlorite method there is a tendency toward low results, most marked in presence of salicylic acid. The presence of ether introduces an error, which is probably due largely to the increased vapor tension. While the inaccuracies of some of the results of this method may be partially attributed to a neglect to make corrections for variation in barometric pressure and for the tension of water vapor, it was proven by parallel estimations during the same atmospheric pressure, that some of the added substances without doubt exert an influence on the volume of gas liberated. This method, then, is also unreliable in presence of organic matter, but less so than the permanganate methods.

The accuracy of the thiosulphate method is practically unaffected by the addition of any of the substances given in the table. The differences in the results are probably due as much to variation in

measuring, etc., as to any other cause and it would seem that, under such conditions as are at all likely to occur in practice, the method can be depended upon to give very serviceable results.

Estimation in presence of larger quantities of glycerin.—In view of the fact that hydrogen dioxide is sometimes used medicinally in combination with glycerin, and that assays of such mixtures, containing comparatively large proportions of glycerin, may become necessary, trials were made to determine the comparative accuracy of the several methods under such conditions. A 10·3 volume solution was used and the results are stated in volume strength.

Grammes of glycerin added to 1 c.c. of solution.	Permanganate method (titr.)	Permanganate method (gasom.)	Hypochlorite method.	Thiosulphate method.
0·5	10·8			
1·	11·25 ; 11·2	9·95 ; 9·8	10·5 ; 10·55	10·3 ; 10·3
2·	12·25		10·5 ; 10·4	10·35

It is seen that the thiosulphate method is first and the hypochlorite second in point of accuracy, while the two others are worthless. With permanganate the reaction is at first extremely slow, but it gradually quickens and the permanganate is decolorized as rapidly as it is added until near the end, when it again becomes very slow.

Summary.—The titrimetric permanganate method is accurate and reliable for the valuation of solutions containing only mineral acids and their alkali salts as impurities. With solutions containing glycerin or boroglycerin in quantities below 5 per cent. the results are but slightly raised; in presence of larger amounts the method is inapplicable. Ethereal solutions give results a little too high. Salicylic acid interferes seriously, even in small quantity. The use of this method should be avoided whenever organic matters are suspected to be present. Applied gasometrically, the permanganate method is unreliable in all cases.

The hypochlorite method gives serviceable results in absence of preservatives. In their presence they are liable to fall too low, and with ethereal solutions they are too high.

The thiosulphate method is simple, rapid and accurate, and its accuracy is not lessened by the presence of the usual preservative agents, nor by large quantities of glycerin. It is applicable in all cases, so far as known. It can be said of gasometric determinations

in general, that they require more time, attention and apparatus than titration methods, and that the results obtained by them cannot be expected to approach the latter in accuracy, unless suitable corrections, requiring tedious calculations, are made for variation in temperature and atmospheric pressure at least.

The work described in this paper was undertaken at the suggestion of Dr. Charles Rice, and the writer wishes to acknowledge valuable advice received from Dr. Rice as also from Prof. Coblentz.

PHARMACEUTICAL LABORATORY OF THE
NEW YORK COLLEGE OF PHARMACY, March, 1898.

NOTE ON BOTANICAL NOMENCLATURE.

BY JOHN URI LLOYD, PH.M., PH.D.

In the minutes of the Pharmaceutical Meeting for March, I notice that Professor Kraemer prefers "the common names of plants as being less confusing."

While that brief note cannot give the breadth of the subject under discussion, and is liable to misinterpretation, still I feel it to be a duty for me to give my experience in a commercial way with some of these plant names. It is, perhaps, the more a duty since both my brother, Curtis, and myself once strenuously advocated the use of *botanical* names only, having gone so far as, in print, to criticise the use of common names by physicians and pharmacists. But subsequent experience, that is unnecessary for me to record in detail, made it necessary for us not only to acquiesce in the use of certain common names, but to publicly advocate them, and in prices current wherein all the botanical remedies used in medicine are named, we years ago excluded from the list the botanical names of certain remedies, referring to them only in notes. In this connection the Euphorbias and Eupatoriums may be cited as examples, experience having shown that physicians and pharmacists alike have less trouble in distinguishing their common names than carrying the botanical distinctions. But there must be a discriminating selection of common names, for the use of such common names as Indian Hemp, Willow Herb, etc., is to be deplored, since they in turn create confusion.

The result of this experience may be of use to others, and I,

therefore, take the liberty to record the names of the drugs to which, in our experience, common names should be applied, as follows:

Asthma Weed, for Euphorbia pilulifera (to distinguish it from other species of Euphorbia).

Black Haw, for Viburnum prunifolium (to distinguish it from Viburnum opulus).

Fragrant Sumach, for Rhus aromatica (to distinguish it from Rhus Toxicodendron).

Gravel Root, for Eupatorium purpureum (to distinguish it from Eupatorium perfoliatum).

Horse Chestnut, for Æsculus Hippocastanum (to distinguish it from Æsculus glabra).

Spikenard, for Aralia racemosa (to distinguish it from Aralia nudicaulis).

Spotted Spurge, for Euphorbia hypericifolia (to distinguish it from Euphorbia corollata and Euphorbia pilulifera).

Swamp Milkweed, for Asclepias incarnata (to distinguish it from Asclepias cornuti and Asclepias tuberosa).

White Snake root, for Eupatorium aromaticum (to distinguish it from Eupatorium perfoliatum and Eupatorium purpureum).

LARREA MEXICANA.

By Clement B. Lowe, M.D.

Last year I received a small quantity of the above-named plant from W. C. Amsden, Ph.G., Class of 1890, of Garner, Iowa, saying that it had been sent by an uncle in California, and requesting information about it. Afterwards, at my request, Mr. Wm. H. Avery, of Los Angeles, California, sent on an ample supply of the drug.

The chemical investigation was carefully performed in the Chemical Laboratory of the College by Wm. E. Krewson, Jr., P.D., Class of 1898.

From the "Botany of California" (Brewer, Watson and Gray), the Botany of the U. S. Death Valley Expedition, 1891, and from other sources, much has been learned about this interesting plant. It was first described by Moricaud, *Pl. Nouv. Amer.*, 71 (1833–46) as Larrea mexicana, N. O. Zygophyllaceæ. Fremont, who met the plant in the Mohave Desert, named it Zygophyllum californicum. In 1848 Engleman published the plant as L. glutinosa. It was named by the government botanist L. tridentata.

It is called by the Mexicans Gobernadora and Hideondo, and popularly Creosote Bush and Greasewood.

The habitat of the plant is rather an extensive one. It is found abundantly in the dry valleys of Kern County and in the Death Valley of Inyo County, California, and eastward from Walker's Pass and Talhichipi to Western Texas, and southward into Mexico; also along the lower Muddy River in Nevada and the Santa Clara Valley of Utah.

The plant is a diffusely branched, densely leafy evergreen shrub, 4–10 feet high. The leaves and small twigs are thinly spread with a covering of a strongly-odorous resin that closely resembles in appearance ordinary shellac. To the abundance of this resinous matter the plant's popular name of creosote bush is due, for in burning the green wood and leaves a pungent odor is detected and a dense smoke arises. The dead branches remain for many years without decomposing, and, although seldom more than 2 or 3 centimeters in diameter, they furnished the principal fuel to the Death Valley Expedition.

The functions of the resin seem to be to lessen transpiration, and thus to adapt the plant to the dry localities in which it grows. If this coating completely covered the leaves throughout the entire year, all evaporation would cease and the death of the plant would ensue, but it has been found that while the leaves in the winter time seem thoroughly varnished, the spring growth examined in June shows very little coating. As many of the herbarium specimens are gathered at this season of the year during the flowering period, they seldom show the resinous coating conspicuously, as it has not yet developed.

The leaves are nearly sessile; the thick resinous leaflets unequilateral, oblong, 3–6 lines long, with a broad attachment of the midrib, somewhat curved and acute. The flowers are solitary, bright yellow, consisting of five ovate, obtuse, silky, deciduous sepals; five unguiculate petals; ten stamens on a small ten-lobed disk, and a five-celled ovary, the cells about six ovuled. The fruit is globose, two and a half lines in diameter, densely hairy, consisting of five indehiscent one-seeded carpels, which at length separate from the axes.

It is said that no animal of the country will eat the plant. It has various reputed properties. Miners say that a strong decoction will

clean amalgam. It is reported that the Indians make a glue from it, with which they fasten the heads of the arrows to the shafts.

Mr. Avery says "that people living in the desert ascribe wonderful properties to it for curing external ailments, as galls and bruises on horses and mules. Pedestrians who become footsore by walking on hot sand claim to have been quickly cured by soaking the soles of their feet in a decoction of this herb."

The following is a summary of the analysis made by Mr. Krewson:

Moisture, 7 per cent.; ash, 7·45 per cent.

Extracted by petroleum ether, 1·87 per cent.	soluble in water, 28·18 per cent. caoutchouc, ·43 per cent. fixed oil and fat, ·93 per cent.
" " stronger ether, 17·27 per cent.	resins and vegetable acids.
" " alcohol, 7·30 per cent.	resins, chlorophyll and vegetable acids.
" " water, 11·71 per cent.	mucilage, 1·92 p. c.; dextrin, 4·33 p. c.; glucose, ·31 p. c.; sucrose, ·12 p. c.
" " alkaline water, 6·24 per cent.	albuminous and mucilaginous matters, ·13 per cent.
" " acidulated water, 3·17 per cent.	(pararabin, 1·59 per cent.)

Starch, 3·21 per cent.

From the analysis, and the report of its uses, it is seen that when used externally it has strong antiseptic and stimulant properties. Its pharmacy has not been studied, but an excellent ointment might be prepared by incorporating a definite amount of the resin with lard, or by digesting upon a water-bath the leaves of the plant with lard. It is possible that when used internally it will prove a stimulating expectorant analagous to eriodictyon.

ALKALOIDAL CONSTITUENTS OF CASCARILLA BARK.[1]

By W. A. H. Naylor, F.I.C.

This paper is intended to be a reply in the main to question No. 12 of the "Blue List" issued by the British Pharmaceutical Conference. The question is: "A re-examination of cascarilla bark is desirable, and particularly with reference to the observation that it contains an alkaloid closely allied to choline." This particular reference to choline is to be found in a paper by Dr. Boehm, an abstract of which appears in the "Year Book of Pharmacy," 1886, page 168.

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[1] *Pharmaceutical Journal*, March 19, 1898.

Fourteen pounds of bark, reduced to No. 40 powder, were exhausted by percolation with chloroform water containing 3 per cent. of oxalic acid. The percolate was made faintly alkaline by ammonia evaporated at a low temperature to one-fifth of its volume, allowed to become cold, and filtered from the crystallized magma which had separated out. The filtrate was precipitated by an excess of lead acetate, and the precipitate collected on a calico filter and well washed. After removal of the excess of lead by the addition of sulphuric acid, the clear liquor from the lead sulphate was rendered faintly alkaline by ammonia and agitated with three successive portions of ether to withdraw the cascarillin that should be present. The same liquid was next shaken in a like manner with chloroform. The chloroformic residue will be referred to presently. The next stage in the series of operations consisted in acidulating the liquid with sulphuric acid (a large excess of acid must be avoided) and adding to it Thresh's reagent in quantity sufficient to effect complete precipitation. The precipitate, after being washed on a filter until quite free from free iodine, ammonium or potassium salts, was decomposed by freshly precipitated silver carbonate in the presence of water and filtered. The filtrate was faintly acidulated with hydrochloric acid and evaporated over a water-bath and again filtered. This final filtrate was precipitated by platinic chloride, and the precipitate was collected and thoroughly drained. The double compound of base and platinum salt was repeatedly crystallized from water and finally washed with absolute alcohol.

The purified platinum compound crystallized from hot water in dark yellow hexagonal plates, and from weak alcohol in octahedral form. A portion of the product was dissolved in hot water and decomposed by sulphuretted hydrogen and filtered. The filtrate was evaporated to dryness, and the residue purified by re-solution in a sufficiency of warm water and evaporation until a white minutely crystalline chloride of the base was obtained. This chloride, when perfectly dry, was practically insoluble in alcohol, and when heated it melted with intumescence and gave off trimethylamine.

Portions of platinum compound were then ignited, with the following results: It should be stated that they represent the product of three different extractions of the bark. Prior to ignition they were dried at 105° C.

(1) 0·215 of platinum compound left on ignition 0·065 of platinum.
(2) 0·335 " " " " 0·100 "
(3) 0·120 " " " " 0·0365 "

(1)	(2)	(3)	Theory of Betaïne.	Theory for Choline.
30·23	29·85	30·41	30·28	31·65

Mean, 30·16 per cent. of platinum.

That the chloride of this base yields on ignition trimethylamine, indicates that it is allied to choline. That its chloride is practically insoluble in alcohol and melts with intumescence on heating, and that its platinum salt yields a mean of 30·16 per cent. of platinum, prove beyond a doubt that the base in question is not choline, but betaïne.

CHLOROFORMIC RESIDUE.

It was treated with warm hydrochloric acid, 3 per cent., the filtered solution was made alkaline with ammonia and then shaken with chloroform. After evaporation of the chloroform the residue was taken up with the weak acid, and, after the addition of ammonia, was again shaken with chloroform. The product, which was not quite free from color, was alkaline and soluble in alcohol, ether and chloroform. It contained nitrogen. A solution of a portion of it in weak acid was precipitated by ammonia, also by iodine and potassium iodide, Mayer's reagent, Thresh's reagent, cadmium and potassium iodide, and phosphomolybdate of sodium. To the solution of another portion in weak acid the addition of platinic chloride gave a buff-colored precipitate, which was collected and washed free from platinum chloride. When air-dried it was soluble in alcohol and crystallized from hot water in prismatic plates. This alkaloidal substance was also obtained from the impure cascarillin yielded by Alessandri's process. The existence of a base in cascarilla bark other than one allied to choline has been a debatable point, but may now be accepted as a fact. It is believed that this is the first time that the alkaloid cascarilline has been isolated and its platinum compound prepared.

My thanks are due to Mr. John J. Bryant for his assistance in carrying out the operations described in this paper.

GLEANINGS FROM THE MEDICAL JOURNALS.

By Clement B. Lowe, M.D.

SERIOUSLY GRAPPLING WITH THE CHARITY ABUSE.

We are pleased to learn that there is one hospital that is in earnest in trying to limit the abuse of its charities. This is the *Philadelphia Polyclinic.* While its New York namesake is doing all it can to increase the abuse and oppose the limitation in that city, in our own institution "no member of its staff is expected to treat free any patient who can pay for medical attendance, either in its dispensaries, wards or private rooms. It has, by rule, prohibited the giving of compensation or 'refreshments' to patrolmen or others bringing patients to the hospital. More than a year and a half ago it had printed the following blank, which is placed in the hands of the doorkeeper to be given to each person who appears not entitled to treatment, with the statement that he must have it properly filled out and bring it back before he can be treated in the institution:

"I hereby certify that I am unable to pay for the services of a doctor, and on that account consider myself a proper person for free treatment in the dispensaries of the Polyclinic Hospital.

"Name

"Address

"The following persons know that I am not able to employ a doctor:

"Name

"Address

"Name

"Address

"It is of interest to note that not one of the persons to whom such a form has been given has returned with it properly filled out. The presumption is that they have either gone to the office of some

physician, or have applied at some other institution where no unpleasant questions were asked. The Faculty has also appointed a committee to consider the Abuse of Medical Charities, and to join with committees appointed for a similar purpose by medical societies, other hospital and charity organizations, in devising means to remedy the more important abuses." All honor to the Philadelphia Polyclinic! Let the rest go and do likewise, or fall under the ban of professional disrespect.—*Phila. Med. Jour.*, March 19, 1898.

The above will receive the hearty commendation of every member of the pharmaceutical profession.

FOR CHRONIC DIARRHŒA.

℞.	Cupri sulphat., Morphiniæ sulphat.,	āā	gr. i
	Quininiæ sulphat.,		gr. xxiv

M. fit. pil. No. xii.—Sig.: One pill three times daily.—*Med. News*, March 12, 1898.

INSANITY ON THE INCREASE IN PHILADELPHIA.

The condition of the Insane Department of the Philadelphia Hospital, recently reported by the grand jury, is interesting in many ways. According to the report, the admissions to this department have increased 85 per cent. within the last ten years, while the proportion of the poor has decreased proportionally to the population and in point of actual numbers. So crowded has this department become that 1,400 patients are accommodated in buildings intended for less than 900. In both the male and female departments, additional quarters are being constructed, which will only permit of accommodations for 100 or 150 more. Beds have had to be placed in the aisles and passage-ways, in order to give sleeping facilities. To properly care for all the insane, the Board of Charities and Corrections have asked that the districts of Germantown, Frankford and Roxborough be consolidated with Philadelphia.—*Jour. Amer. Med. Assoc.*, March 26, 1898.

FOR SPASMODIC CROUP.

Stimson advises the following treatment, which, in his hands, has proved successful even in very severe cases. The child is first given an emetic in warm water in teaspoonful doses. It is then put in a hot bath, and, after this, flannels wrung out of hot mustard water (four teaspoonfuls of mustard to the quart) are applied to the neck

and chest. A 2 per cent. cocaine spray is of great service in overcoming the laryngeal spasm. After the immediate danger is past, the following mixture should be given until the catarrhal symptoms have disappeared:

℞.	Syr. scillæ,		ʒ iss
	Tr. opii camphorat.,		ʒ ii
	Tr. tolutan, } āā		℥ i
	Glycerini, }		
	Aq. dest.,	q.s. ad	℥ iij

M. et Sig.: One-half teaspoonful every three hours of the day, and every four hours at night.—*Med. News*, March 19, 1898.

BOILED ANTITOXIN.

A physician wrote to a manufacturer of antitoxin, inquiring whether the syringe or the antitoxin was to be boiled before using? It need hardly be said that boiling, of course, destroys the albuminous material, and yet the manufacturer writes us that he has on hand something like $13 worth of boiled antitoxin returned by physicians who gained wisdom by expensive experience.—*The Phila. Med. Jour.*, March 26, 1898.

THE COMMUNICATION OF VENEREAL DISEASE A CRIMINAL OFFENCE.

A measure is just being discussed before the German Reichstag, whose purpose is the prevention of the spread of venereal disease. Any one found guilty of having communicated a venereal disease to another shall be punishable by *fine and imprisonment.* Certain circumstances are considered to mitigate the offence, especially in the married, and when the disease has been innocently acquired. It is an attempt to solve a difficult social question from another point of view than that from which it is usually approached.—*The Phila. Med. Jour.*, March 26, 1898.

INTESTINAL ANTISEPTIC MIXTURE IN TYPHOID FEVER.

℞.	Salol,	ʒ i
	Thymol,	gr. xxxvi
	Bismuth. subnit.,	ʒ ii – iv
	Mucilag. acacia,	ʒ ii
	Syr. tolutan,	ʒ iv

M.—Sig.: One teaspoonful three times daily.—*Med. News*, April 2, 1898.

FOR CHRONIC FOLLICULAR PHARYNGITIS.

℞.	Iodi pur.,	gr. iii
	Potass. iodid.,	gr. v
	Acid trichloracetici,	gr. vi
	Glycerini, } āā	℥ ss
	Aq. dest., }	

M.—Sig.: Apply by means of cotton applicator in full strength, or diluted, as may be indicated.—*Med. News*, April 2, 1898.

NEW COMPETITORS IN THE MEDICAL FIELD.

In spite of the vigilance and persistence practised by the medical profession in suppressing irregularities in its domain, some unexpected dragon is constantly protruding his obnoxious head. The latest surprise comes in the form of spiritualistic mediums, who are supplying prescriptions written by celebrated physicians, many of them long forgotten, who have left the terrestrial for the spirit world, but who, nevertheless, have not lost their interest in the practice of medicine.

A specific instance of this has recently occurred in England, and the question has arisen whether such prescriptions can be recognized and compounded by a legitimate chemist, and also who is to assume the responsibility of the effect of such prescriptions on the individuals taking them.—*Med. News*, March 19, 1898.

BRYONIN IN THE TREATMENT OF HEPATIC CONGESTION.

The *Gazette hebdomadaire de medicine et de chirurgie*, for February 3d, gives the following formula:

℞.	Bryonin,	1½ grains.
	Sugar of milk,	60 "
	Gum arabic,	15 "
	Syrup,	q.s.

M.—Divide into a hundred granules. One to be taken every two hours, until the bowels are sufficiently moved.

MEDICAL ETIQUETTE IN CHINA.

Chinese doctors are said to be even more scrupulous than their white brother practitioners in regard to the nice points of professional etiquette. The following amusing tale is related in an English journal: "A Chinese gentleman was struck by an arrow, which remained fast in his body. A surgeon was sent for, and broke off the protruding bit of the arrow, leaving the point embedded. He refused to extract it, because the case was clearly one for a physician, the arrow being inside the body."—*Medical Record.*

AN OINTMENT FOR ACUTE ARTICULAR RHEUMATISM.

℞.	Vaselin,	25 parts.
	Salicylic acid,	4 "
	Sodium salicylate,	3 "
	Extract of belladonna,	1 part.

M.—To be applied and covered with cotton.—*N. Y. Med. Jour.*, March 26 1898.

THE TEETH AND THE SOIL.

Examination of recruits in Bavaria and Sweden conducted on a large scale have confirmed the assumption that the richer the soil in lime and magnesia, the harder the drinking water, the more perfect the development of the teeth.—*Münch. Med. Woch.*, November 3, 1898.

A CHEMIC VACCINE FOR VIPERS' VENOM.

The above is announced to have been discovered by C. Phisalix, in tyrosin, found in certain plants, especially in the tuber of the dahlia and a mushroom. Two or three cubic centimeters of a hundredth solution will confer immunity to the venom upon a guinea-pig after twenty-four hours, lasting frequently for twenty-five days. It has no antitoxic power injected at the same time as the venom, nor any effect as an antidote, but merely acts as a chemic vaccine, the first known example of the cellular juice of a plant possessing immunizing properties in regard to snake poison. The immunizing action of the cholestrin of the bile, and also of the vegetable cholestrin found in the carrot by Arnaud, has already been noted by Phisalix. —*Presse Med.*, February 12, 1898.

IMMUNITY TO THE STING OF BEES.

Dr. Lauger, of Bohemia, stated at the recent Congress of German Naturalists and Physicians, that he found the majority of bee-keepers in his district (Ruschowan) acquire a complete immunity to the stings of those insects, while some seem to enjoy that immunity from the first possibly by inheritance. Of 153, 9 had always been insusceptible, 118 had acquired the immunity, 26 had not. In some cases it was so complete that, when intoxicated, men had been stung in from fifty to one hundred places with less suffering than is felt by most persons from flea bites. He found the poison to be an animal alkaloid, and not, as is commonly believed, formic acid. The best treatment is a subcutaneous injection of a 2

to 5 per cent. solution of potassium permanganate, as this salt in the proportion of one to twenty destroys this poison.—*The Practitioner*, February, 1898.

AN APPLICATION FOR DENTAL CARIES.

The *Gazette hebdomadaire de medicine et de chirurgie*, February 10th, attributes the following formula to Desnoyer:

℞.	Crystallized carbolic acid,	} each 2 parts.
	Essence of lemon,	
	Alcohol,	10 "

M.—The cavity is washed and dried, and a little pellet of cotton soaked in the solution is inserted. Over this another pellet of cotton charged with tincture benzoin is placed. The lemon is used simply to mask the odor of the carbolic acid.

RECENT LITERATURE RELATING TO PHARMACY.

FLUID EXTRACT OF LICORICE.

Peter Boa (*Pharmaceutical Journal*, February 26, 1898) in commenting upon the method of the British Pharmacopœia for the above preparation says that it is a process of double maceration with cold water, heating to boiling point, straining, evaporation to a specified gravity when cold, and preservation by spirit. Continuing, he says that two points deserve notice as being characteristic of this fluid extract. One is that it has to be evaporated so that, when cold, it shall have a specified gravity of 1·160; the other is that only one sixth of its volume of spirit has to be added, presumably to preserve it. In short, the object is to extract the sweet principle with water, which at the same time takes out albuminous and mucilaginous matter; to coagulate the albumen by heat and remove it by straining, and finally, for preservative purposes, to add the spirit which still further clears the extract by throwing down part of the mucilaginous matter.

In comparing the product made according to the above process with that made according to the U.S.P. method, he found the latter to compare very unfavorably with the former. It had an acid bitter flavor which quite overpowered the sweetness; while the B.P. extract possessed a sweet mellow taste, free from acidity and with only a faint bitterness. The bitterness of the U.S.P. extract was accounted for by the fact that licorice root contains, besides the sweet principle, an oleoresinous acrid principle and a bitter prin-

ciple, both of which are more soluble in alcohol than in water, and hence are extracted in larger proportion when alcohol is used.

With regard to the use of ammonia the author carried out experiments which seemed to indicate that it is not only unnecessary in the preparation of the fluid extract of licorice, but that it is distinctly objectionable. It alters the taste of the extract, but it does not appear to increase the sweetness.

Some improvements as to details for the B.P. process are suggested, the principal recommendation being that of percolation, instead of maceration and expression of the drug as now directed. The principal difficulty encountered in percolating the drug with water alone is that the percolate is liable to become acid before extraction is complete. The writer overcomes this objection, however, by adding just a sufficient quantity of ammonia water to the aqueous percolate to preserve its alkalinity while percolation is proceeding, which results in a loss of glycyrrhizin. In other words, he does not use ammonia in extracting the sweetness of the drug, but in preserving the sweetness of the extract.

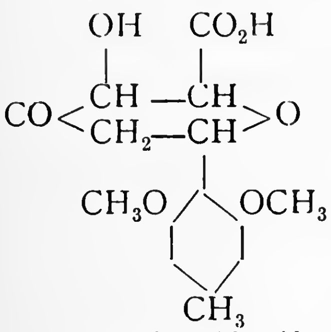
Finally, in summarizing his views of the subject, he says that water is the best menstruum for extracting the sweetness of licorice; if percolation of a rougher powder were substituted for double maceration and expression of the root in No. 20 powder, as directed by the B.P. formula, the process would be a more skillful one; ammonia might judiciously be employed as indicated to prevent loss of sweetness; and that a slight increase in the amount of alcohol would insure preservation and produce a cleaner extract.

A CHEMICAL EXAMINATION OF THE CONSTITUENTS OF INDIAN AND AMERICAN PODOPHYLLUM.

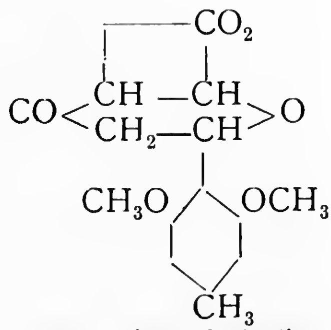
W. R. Dunstan and T. A. Henry (*Proceedings of the Chemical Society*, London, March, 1898), find that the constituents of Indian podophyllum (*Podophyllum emodi*) and of American podophyllum (*Podophyllum peltatum*) are identical. The chief constituent is the *podophyllotoxin* of Podwyssozki and Kürsten which the authors have fully examined. It is a neutral crystalline substance (melting point 117°) to which the authors assign the formula $C_{15}H_{14}O_6$. It is strongly lævorotatory, and acts as a powerful purgative and intestinal irritant. When heated with alkalies, it is converted by hydration into the salt of an unstable, gelatinous acid,

podophyllic acid, $C_{15}H_{16}O_7$, of which a crystalline sodium salt was obtained, and also silver and copper salts, which were analysed. This acid very readily loses water, and furnishes the crystalline *picropodophyllin* of Podwyssozki and Kürsten, which is isomeric with podophyllotoxin. It passes again into podophyllic acid when warmed with aqueous alkalis. It melts at 227°, and is optically inactive. Podophyllotoxin and picropodophyllin furnish identical decomposition products; when oxidised with nitric acid, *oxalic acid* is the principal product; when fused with alkalis, *orcinol* and *acetic acid* are produced. Both substances contain two methoxyl groups and no hydroxyl. It is concluded that picropodophyllin is the lactone of podophyllic acid, which is probably the hydroxy-carboxylic acid of *dimethoxymethyl-phenylhydro-γ-pyrone*.

The following formulæ are assigned to these compounds:



Podophyllic acid.



Picropodophyllin.

The nature of the isomerism of podophyllotoxin and picropodophyllin remains to be determined. The latter substance is therapeutically inert.

The yellow coloring matter of podophyllum, called by Podwyssozki podophylloquercetin, is proved by the authors to be identical with *quercetin*, the valuable yellow coloring matter of quercitron bark.

An uncrystallisable resin, *podophylloresin*, was also isolated and found to exert a purgative action.

Estimations have been made of the amount of "podophyllin" (a mixture of resins with podophyllotoxin which is used in medicine) contained in the two plants. Indian podophyllum contains from 9 to 12 per cent., and American from 4 to 5 per cent. The two resins have been proved to be equally valuable therapeutic agents. The amount of crystalline podophyllotoxin in the Indian plant varies

from 2 to 5 per cent., whilst representative samples of the American rhizome were found to contain rather less than 1 per cent.

Indian podophyllum is likely to be valuable both as a drug and as a dye-stuff.

DISCUSSION.

Mr. E. J. Millard asked if Professor Dunstan had noticed and could account for the smaller solubility of the resin from *P. emodi.* This was specially marked in the presence of a small quantity of an alkali when it assumed a gelatinous consistency. Since attention had been drawn to this resin by Professor Dunstan, manufacturers had prepared it in considerable quantities, and it was known commercially as the less soluble variety.

Professor Dunstan said, in reply, that any difference that may be observed in the solubility and other properties of podophyllin resin prepared from Indian podophyllum and that prepared from American podophyllum was probably accounted for by the different proportions in which the constituents were mixed in the resins prepared from the two sources, and not by any difference in the constituents themselves.

KINO.

The conditions which regulate the price of kino and its sources are described by A. E. Bertie-Smith in the *Chemist and Druggist* for March 5th. He says:

The principal ports from which gum-kino is usually shipped are Alleppi and Calicut, and at these ports and at others, such as Tellicherry and Cochin, are settled some three or four old European firms who control the export trade. One or more of these firms have succeeded in getting into their hands the whole of the arrivals of gum-kino from up-country districts, with the result now so well known in the London drug market.

In 1889 and 1890, when I was in Bombay, my firm there were in receipt of regular shipments of kino from the Malabar ports. I enclose an original quotation and an invoice from the firm of Andrew & Co., of Allepey, from which you will see that in 1889 I made a purchase from them of gum-kino at 16*r.* 8*a.* per cwt., or less than 2½*a* (2½*d.*) per pound, which, indeed, is its full value at Bombay.

About 1891 I found none of the above-mentioned shippers in

Malabar could or would supply us, and when the price rose so much in London we wrote a letter to Messrs. Andrew & Co., accusing them of cornering the drug, which accusation they never troubled to deny. It was comparatively easy for this firm to get hold of all shipments of kino, they being agents of the British India Steam Navigation Company, running the only steamers, excepting those of the Asiatic Company, which called for cargo at the Malabar ports; and having to issue the bills of lading, they would know when any of the drug was for shipment. Occasionally, however, a "tramp" vessel loads cargo for New York or other United States ports, and this would probably account for kino reaching the London drug market *via* New York.

For some years after the great rise in price at the London drug auctions, kino could be obtained in small quantities in the Bombay drug bazaar at one-third of the advancing London rate, owing to the fact that a certain amount came up from Malabar to Bombay in bugalows (country sailing-boats) shipped by natives to natives, which consignments European houses would know nothing about.

Until the demand for kino ceases altogether, it will, no doubt, be much more profitable for the monopolists to buy all that comes to hand, shipping only a moiety and destroying the rest, than to ship the quantities formerly exported and sold for just what the London wholesale druggists cared to give at the drug auctions. The monopoly could probably be broken by calling the attention of the Government of India to the present condition of the kino market, for the Forest Department is always willing to advise collectors how to get a better price for produce.

ON OXYCANNABIN FROM INDIAN HEMP.

A study of the above substance is reported by W. R. Dunstan and T. A. Henry (*Proceedings of the Chemical Society*, London, March, 1898).

Oxycannabin is the name given by Bolas and Francis to a crystalline substance they obtained by acting on the pharmacopœial extract of Indian hemp with concentrated nitric acid (*Trans.*, 1869, **22**, 417; *Chem. News*, 1871, **24**, 77). They obtained it in the form of yellow needles, melting at 176°, and represented its composition by the formula $C_{20}H_{20}N_2O_7$. In the course of the examination of

the constituents of Indian hemp, the authors have prepared the substance in this way, and have also obtained it by the action of fuming nitric acid on the "cannabinol" isolated by Messrs. Wood, Spivey and Easterfield (*Trans.*, 1896, **69**, 544) from the "charas" or resin of Indian hemp.

When quite pure, oxycannabin crystallizes in colorless needles, melting at 182°; it is insoluble in water, but soluble in hot alcohol, crystallizing out on cooling. It sublimes when gently heated, and may be easily purified in this way. On combustion, the substance gives numbers agreeing with those required by the formula $C_{10}H_{10}NO_4$.

It does not dissolve in aqueous alkalis unless warmed with them in a closed tube. By acidifying the resulting solution an acid is precipitated, which is at present under investigation. "Oxycannabin" would, therefore, appear to be a lactone.

On reduction with hydriodic acid, or with tin and hydrochloric acid, oxycannabin furnishes a volatile amine. The hydrochloride of this base, though itself unstable, gives a well-crystallized platinichloride.

When heated with zinc dust, oxycannabin gives off a large amount of an inflammable gas (probably methane), and a quantity of an aromatic hydrocarbon is produced, which forms a well-crystallized compound with picric acid.

By the action of nitric acid on cannabinol, normal butyric acid was also produced, together with oxalic acid.

As the substance is thus proved to be a nitro-compound, the name "oxycannabin" is inappropriate, but it would be premature to propose a new name until more is known about the constitution of the compound.

In the course of purifying cannabinol through the acetyl derivative mentioned by Messrs. Wood, Spivey and Easterfield, the acetyl derivative was obtained in colorless crystals melting at 75°, and which corresponded in composition to the formula $C_{18}H_{23}AcO$.

The *dry distillation of sawdust* is, according to the British Consul at Christiana, one of the latest enterprises in Norway. The products are acetic acid, wood naptha (methyl alcohol) and tar. A factory has been started at Fredrikstad capable of distilling 10,000 tons of sawdust during the year, and also of manufacturing charcoal briquettes, which are exported to the Netherlands. The acids are chiefly placed on the German market, while the tar is mostly consumed at home.—*Journal of the Society of Chemical Industry*, January 31 1898.

EDITORIAL.

AMERICAN GINSENG.

The output of literature concerning the production of ginseng during the past month has been considerable. Bulletin No. 16 of the United States Department of Agriculture is the most important contribution, but two others in Consular Reports for April are of considerable interest; they are entitled "American Ginseng in China" and "Ginseng in Korea." It is interesting to note that both consuls call attention to the fact that the use of ginseng among the Chinese is almost entirely one of sentiment, yet every man, woman and child in China uses it not only as a cure for all kinds of diseases, but also as a preventive against dreaded ailments. It is evident that the American product cannot replace that from Korea, nor compare favorably with it in price, as the statistics for 1896 show importations through Chinese customs of 353,147 pounds, valued at $656,515 gold, or about $1.86 gold per pound, while the importations from Korea for the same period amounted to 14,987 pounds, valued at $247,137 gold, or $16.50 per pound. This is supposed to represent only about one-half the actual importation, as smuggling in this article is extensively carried on. Another consular statement is to the effect that the American ginseng readily finds sale at $3.00 to $3.50 per pound, and special pieces of the more desirable shapes might be sold at ten times that price. The Bulletin of the Agricultural Department details the commercial history and cultivation of ginseng. Already considerable tracts are under cultivation in this country, and it is evident that whatever future there is in this industry must come from the cultivated article.

SUCCESSFUL TEA GROWING IN AMERICA.

This is the title of a paper in the April number of the *Cosmopolitan Magazine*, and the author, Mr. LaFayette I. Parks, makes out a case which justifies the title. It appears that at present the only tea plantation in the United States is situated at Summerville, South Carolina, and is the property of Dr. Charles U. Shepard. Last season upward of 1100 pounds of the finest tea obtainable was marketed, and this year's crop will, he states, amount to more than 2,000 pounds. As long ago as 1877 the Department of Agriculture investigated the possibilities of raising tea in the United States, and "after thorough inspection of Mr. Shepard's tea plantation, Mr. Saunders made a very favorable report, predicting that it would only be a question of time when our farmers will supply sufficient tea for home consumption." Mr. Shepard calls attention to the fact that this undertaking is largely experimental in character; he believes the present indications promise that the venture will prove profitable, although the object in view is only in part industrial. One of the chief commercial difficulties is the relatively high price of labor in the United States compared with that in the countries in which tea is produced at present.

The product has been declared to be equal to any sent to the United States from the Orient. All that has been offered has always found a ready sale. Two photographic reproductions accompany the paper, illustrating the process of picking the leaves, and a field of the plants two years old raised from seeds.

Almost exactly in contradiction to the foregoing, is a statement in the *Chemist and Druggist* for April 2, which asserts that "tea planting in the United States is at present a failure." No authority for this sweeping state-

ment is given, and, since no claim is made that the industry has advanced beyond the experimental stage, and the experiment is still in progress, it is difficult to see how it can be designated a failure.

GEORG DRAGENDORFF.

The death of this well-known scientist occurred on the 7th of April, at his home in Rostock, Germany. He was born on the 20th of April, 1836. A more extended sketch will be published in a future number of this journal.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

MISSOURI BOTANICAL GARDEN'S NINTH ANNUAL REPORT. William Trelease, Director, St. Louis, Mo., 1898. The ninth annual report covers the year 1897, and contains the reports of the Board of Trustees and of the Director; these, however, occupy but twenty of the 160 pages, the balance being devoted to scientific papers. These papers are illustrated by 150 plates, and several handsome photographic reproductions are interspersed through the other portion of the book. All the scientific papers are interesting, but the attention may especially be called to: "A Revision of the Genus Capsicum with especial Reference to Garden Varieties," by H. C. Irish; "Miscellaneous Notes on Yuccas" by W. Trelease; "The Missouri Dogbanes," by W. Trelease, and "A Coloring Matter found in Borraginaceæ," by J. B. S. Norton. The whole book is fully up to the high standard of its predecessors.

ANNUAL AND ANALYTICAL CYCLOPÆDIA OF PRACTICAL MEDICINE. By Charles E. deM. Sajous, M.D., and one hundred associate editors. Volume I. The F. A. Davis Company, publishers, Philadelphia, New York and Chicago, 1898.

THE ANNUAL OF THE UNIVERSAL MEDICAL SCIENCES, consisting of five volumes, was first issued ten years ago; it has always met with a warm welcome, but has come to be considered too bulky for the modern busy physician; therefore, the present work, which will probably consist of six volumes of 600 pages each, will replace it. In this first volume there is an immense amount of valuable medical and pharmaceutical literature condensed into a small space. The titles extend alphabetically from Abdomen to Bright's Disease.

The editor deserves great credit for the able manner in which he has performed his duties. Notwithstanding the fact that he has had the assistance of so many able associates, the detail work, arranging, and the bulk of the abstracting has been done by himself. The illustrations are numerous and have been well executed.

REPORT OF PROCEEDINGS OF THE ILLINOIS PHARMACEUTICAL ASSOCIATION, at its Eighteenth Annual Meeting, held at Champaign, June 2-3, 1897.

In addition to the committee work of the Association, the following papers were presented: "Emergencies, How to Treat Them," by W. H. Garrison, and "An Examination of Some Chemicals of Commerce," and "A Microscopic Examination of Some Powdered Drugs of the Market," by the School of Pharmacy of the University of Illinois.

ÉLOGE DE M. CAVENTOU, lu a l'Académie de Médecine, dans la Séance annuelle du 14 Décembre, 1897. Par M. J. Bergeron, Secrétaire Perpétuel de l'Académie. Masson et Cie, Éditeurs. Paris. 1897.

Until this octavo pamphlet of twenty-five pages appeared, the literature concerning Caventou was quite meagre; now, however, we have a full record of this remarkable man. Both Pelletier and Caventou began professional life as pharmacists, and were closely associated with that calling during their lives. Their combined discoveries have been of the greatest value to mankind, and individually Caventou made a number of the discoveries of great practical and scientific interest.

ON THE CINNAMOMUMS OF NEW SOUTH WALES; WITH A SPECIAL RESEARCH ON THE OIL OF C. OLIVERI, BAIL. By R. T. Baker, F.L.S. From the *Proc. of the Linnean Society* of New South Wales, July 28, 1898.

Prior to the publication of this paper there appears to be no record of the occurrence in the colony of New South Wales of any indigenous representative the genus Cinnamomum; now, there are shown to be at least two species, viz., C. oliveri, Bail, and C. virens, sp. nov. The bark of the former yields about 1 per cent. of a very fragrant oil.

ON THE SACCHARINE AND ASTRINGENT EXUDATIONS OF THE GREY GUM, EUCALYPTUS PUNCTATA, D. C., AND ON A PRODUCT ALLIED TO AROMADENDRIN. By Henry G. Smith, F.C.S. From the *Proc. of the Royal Society of New South Wales*, August 4, 1897. This publication will receive attention in a future number of the JOURNAL.

CONTRIBUTION TO A KNOWLEDGE OF THE FLORA OF AUSTRALIA, No. I. By R. T. Baker, F.L.S. From the *Proc. of the Linnean Society of New South Wales*, June 30, 1897.

MEDICINISCHE NOTIZEN AUS JAPAN. Von Prof. Dr. O. Loew. From *Münchener med. Wochenschrift*, No. 12, 1898.

This contains an account of the climate of Japan, which is shown not to be so delightful as represented.

SUR LES PROPRIÉTÉS TOXIQUES DU DIPLOTAXIS ERUCOIDES, D. C. Par Docteur Louis Planchon. Montpellier, 1898.

DIE HEILPFLANZEN DER VERSCHIEDENEN VÖLKER UND ZEITEN. Von Dr. med. et. phil. Georg Dragendorff. Lieferungen 1 und 2. Verlag Von Ferdinand Enke, Stuttgart, 1898. Two parts, amounting to some 300 pages, of this work have been received, but no adequate idea of the whole can be found until nearer completion; then a complete review will be published.

AMERICAN GINSENG; ITS COMMERCIAL HISTORY, PROTECTION AND CULTIVATION. By George V. Nash. Revised and extended by Maurice G. Kains. Bulletin No. 16, U. S. Department of Agriculture, Division of Botany, Washington, D. C., 1898.

This is a revised edition of the Bulletin on the same subject published in 1895. Considerable progress has been made in the cultivation of the root in three years, and the cultivated root has brought as high as $6 per pound, or $1 to $1.50 higher than the wild root.

PHILADELPHIA COLLEGE OF PHARMACY.

The following are the questions given to the Third Year Class at the recent examinations:

THEORY AND PRACTICE OF PHARMACY.

A—(1) How many grammes of Massa Hydrargyri will be required to make 144 five-grain blue pills? (2) How much mercury would there be in the whole quantity? (3) How would you take the specific gravity of a five-grain blue pill? (4) What would be the object or purpose of taking the specific gravity of blue mass?

B—Give the synonym, unabbreviated official or Latin name, ingredients, brief outline of process and describe the appearance of Infusion of Cinchona, Spirit of Gaultheria, Flexible Collodion, Aromatic Tincture of Rhubarb, Fluid Extract of Senega, Confection of Senna, Vallet's Mass, Solidified Copaiba.

C—Give the official name, English name, ingredients, brief outline of process, and describe the appearance of Bismuthi et Ammonii Citras, Liquor Potassii Arsenitis, Infusum Digitalis, Syrupus Scillæ Compositus, Pilulæ Catharticæ Compositæ, Pulvis Aromaticus, Unguentum Potassii Iodidi.

D—What pharmaceutical difficulties would you encounter in making the following preparations, stating the cause of the difficulty? How should the preparations be made? and why? (1) Fluid Extract of Calumba, with 20 per cent. of alcohol and calumba in very fine powder. (2) Ointment of Mercuric Nitrate if lard oil is furnished of common quality containing paraffin oil. (3) Solution of Ferric Sulphate with nitric acid of specific gravity 1.25. (4) Ointment of Zinc Oxide, with commercial oxide of zinc of the cheapest grade.

E—(1) What menstruum is best adapted for exhausting aconite root? (2) What alkaloid does this root contain? (3) What acids are found naturally in the root? (4) What physiological action do aconite preparations exhibit when taken into the stomach? (5) Describe and illustrate (by a sketch) a stomach-pump; what is its aim and purpose? explain its method of use.

MAGISTRAL PHARMACY.

F—Define Chemical, Physical, and Therapeutical Incompatibility, and write three prescriptions, giving correct metric doses, illustrating each kind of incompatibility. (1) Chemical Incompatibility. (2) Physical Incompatibility. (3) Therapeutical Incompatibility.

G—(1) In compounding prescriptions, state under what circumstances it is advantageous to aid the solution of a solid by heating it with the solvent. (2) State when it is proper to filter a prescribed liquid preparation, and explain why, for certain reasons, filtration sometimes should not be resorted to. (3) When is it permissible to make an addition to a prescription without the consent of the prescriber? Give reasons for your answer. (4) Is it desirable, when renewing a prescription, to follow the order of mixing the ingredients originally used? If so, why?

H—(1) What is meant by compressed tablets? (2) Describe their method of manufacture. (3) Are all medicinal powders compressible without admixture with foreign substances? If not, explain why. (4) What is a pill-excipient? (5) Name five pill-excipients, and give five illustrations of official pills for which each would be well adapted.

I—Criticise the following prescriptions, stating whether you would compound them as written. If not, why not? How would you proceed if such were presented to be filled?

℞	Plumbi Acet.	gr. xi
	Bismuth Subnit.	ʒjs
	Acid Sulph. Arom.	fʒjs
	Quiniæ Sulph.	gr. xx
	Aquæ Anisi	ad. f℥iv

Sig.—A teaspoonful three times a day.—DR. BROWN.

℞	Ext. Secale Cornut., Fld.	f℥i
	Vin. Ejusdem	f℥i
	Sacch. Alb.	ʒjs

Sig.—One teaspoonful every two or four hours as needed.—DR. LOWE.

℞	Potassii. Iodid.	ʒiijs
	Hydrarg. Bichlor.	gr. xx
	Alcohol	f℥js
	Tr. Cinch. Comp.	f℥iiijs

Sig.—A teaspoonful three times a day.—DR. SMITH.

PHARMACY LAWS.

K—(1) In what State have you practised or studied pharmacy? (2) Give briefly the essential features of the pharmacy law of such State. (3) Should a pharmacy law protect the pharmacist or the public? Give reasons. (4) What are the advantages of a law compelling apprentices to register after examination? (5) How, in your opinion, should Boards of Pharmacy be appointed?

CHEMISTRY.

A—(1) Give the general formula for the series of saturated hydro-carbons. (2) By what chemical reactions can you distinguish unsaturated hydro-carbons from saturated? (3) State the occurrence in nature and the artificial production of both classes. (4) Is the benzene series a saturated or an unsaturated series? Show this by the graphic formula.

B—(1) Give the distinction between primary and secondary alcohols, using graphic formulas. (2) How are each of these classes respectively affected by oxidation? (3) Illustrate by the case of primary and secondary propyl alcohols, naming the products obtained.

C—(1) Upon what does the basicity of an organic acid depend? (2) Write the graphic formulas of *acidum aceticum*, *acidum tartaricum*, *acidum lacticum*, *acidum benzoicum*, *oxalic acid* and *formic acids*, and state the basicity of each. (3) What is meant by the term "unsaturated acid?" (4) What is "phenol-acid?"

D—(1) What is meant by an Ester? (2) Give an example of an ester of an inorganic acid. Of an organic acid. (3) What is meant by saponifying an ester? Write a reaction in illustration of this process. (4) Name some official ester of the fatty acids. Some official esters of aromatic acids.

E—(1) What is an *Enzyme?* (2) Write some reactions brought about by the action of enzymes. (3) State the conditions most favorable for the alco-

holic fermentation. (4) What are the important differences in the condition needed for the acetic and lactic fermentations?

F—(1) Describe Phenol and give its official name and ordinary source. (2) How can it be made artificially from benzene? (3) Give the most characteristic pharmaceutical tests for identity. (4) How is "phenacetin" related to Phenol?

G—(1) Describe Benzaldehyde and give its official name and earliest source. (2) How can it be made artificially from benzene? (3) Give the most characteristic pharmacopœial tests for its identity. (4) Give the name and formula for the corresponding phenol-aldehyde.

H—(1) Please give an outline of the method of examination for poisons in a mixture of unknown composition. (2) Mention the most important of alkaloidal reagents.

I—(1) How would you proceed in a case of suspected arsenic poisoning? (2) What are the tests which enable one to distinguish arsenic from antimony? (3) What is the best antidote in cases of arsenic poisoning, and how is it prepared?

K—(1) State the important determinations to be made in the analysis of a potable water? (2) What is the meaning of the term "albuminoid ammonia," and what does its relative amount in a water indicate? (3) How are the determinations of "free ammonia" and "albuminoid ammonia" made?

MATERIA MEDICA.

A—Opium.—(1) Give the botanical origin, natural order and habitat. (2) State the manner of collection. (3) What adulterations are sometimes present? (4) Briefly outline Hager's test for adulterations. (5) Name a physiological antagonist. (6) Give the maximum doses of opium, morphine and codeine.

B—Asafœtida.—(1) Give the botanical origin, natural order and habitat. (2) State the manner of collection. (3) Name the varieties. (4) What per cent. of resin should it yield? (5) What is the color test for it? (6) What adulterations are often present? (7) Name its constituents. (8) State its medicinal properties and dose.

C—Natural Order Leguminosæ.—(1) Name two official balsams yielded by plants belonging to this order. (2) State the manner of their collection. (3) Name an official oleoresin obtained from South America. (4) Name three commercial varieties of it. (5) Give official name, botanical origin and habitat of a gum which is a degradation product of the cells of the pith and medullary rays. (6) Name two official extracts or inspissated juices. (6) Which one of these tinges the saliva a deep red?

D—Animal Drugs.—(1) Name ten official drugs of animal origin, and the animals from which they are obtained. (2) Which of them is a vesicant? (3) Which of them is powerfully odorous? (4) Which of them yields a coloring principle? (5) Which are used in ointments? (6) Which are enzymes? (7) Which is used as a protective?

PHYSIOLOGY.

E—Bones and Articulation.—(1) Describe briefly the structure of bone. (2) Locate the femur. (3) With what bones does it articulate? (4) Name the kind of joints by which it is articulated. (5) Locate the hyoid bone. (6) What important organ is joined to it by its base? (7) Name the first and second vertebra. (8) How are the movements of nodding and rotating the head accomplished?

F—Digestion.—(1) Name the seven stages. (2) Name the different ferment principles which act during digestion, the organs by which they are secreted, and the functions of each. (3) What is the difference between chyme and chyle? What are the uses of valvulæ conniventes?

G—The Eye.—(1) Name the three coats, and state the functions of the inner one. (2) Name the refracting media. (3) What are the functions of the iris? (4) Name two mydriatic drugs. (5) Name two myotic drugs. (6) What defect exists in myopic eyes? (7) What defect exists in hypermetropic eyes?

PHYSIOLOGICAL ACTION OF DRUGS.

H—Antiseptics, Anthelmintics, etc.—(1) State the meaning of the terms, Aseptic, Antizymotic, Antiseptic and Germicide. (2) Give an illustration of each. (3) Name an anthelmintic flower drug, fruit drug and rhizomic drug. (4) Name a tænifuge bark drug, rhizome drug, and seed drug. (5) Name two topical sialagogues and two general or systemic sialagogues. (6) Name an antisialagogue.

I—Emetics, Purgatives, etc.—(1) Name two local or direct emetics, and two general or systemic emetics. (2) Name two antiemetics. (3) Name a drug which increases and one which decreases peristalsis. (4) Name a simple laxative and a drastic purgative. (5) Name two saline cathartics. (6) Name two cholagogue purgatives. (7) Name an intestinal astringent.

K—Drugs Acting upon the Blood, Heart, etc.—(1) Name three drugs which alkalize the blood. (2) Name two hæmatinic drugs. (3) Name two which are hæmostatics. (4) Name a vesicant, a pustulant and an escharotic. (5) What effect does carbon monoxide have upon the hæmoglobin of the blood? Give also that produced by large doses of antipyrin. (6) Name two cardiac tonics which increase the force of the heart's contraction, and decrease the number of beats. (7) Name two cardiac sedatives which lessen the force and frequency of the heart's action.

COMMITTEE.

A—Lead.—(1) Give Latin name, specific gravity, symbol and valence of Lead. (2) Name some of the localities from which it is obtained. (3) In what combination does Lead usually exist in nature? (4) What process is generally used in separating it from this combination? (5) Name three compounds formed by Lead with oxygen, giving their symbols. (6) What is the most important soluble salt of Lead? (7) Write the chemical formula and give the official name of White Lead. (8) Outline the process for "Goulard's Extract," name the salt and percentage of it contained in the extract. (9) Give two tests for the compounds of Lead. (10) Name two official preparations containing Goulard's Extract and give the ingredients of each.

B—(1) What are Alkaloids chemically? (2) What elements do they all contain? (3) How do volatile alkaloids differ physically from non-volatile alkaloids? How do they differ chemically? (4) How do Alkaloids differ from their salts as to solubility in water? (5) Mention one or more reagents by which Alkaloids are precipitated from their solutions. (6) What termination does the official nomenclature of Alkaloids require? In English? In Latin? (7) Name three (3) official drugs yielding Alkaloids. (8) Name the Alkaloid obtained from each of these drugs. (9) Give the dose of each. (10) Name two Alkaloids classed as mydriatics.

C—(1) What is the botanical name, natural order and habitat of the plant yielding Glycyrrhiza? (2) To what principle does Glycyrrhiza owe its sweetness? (3) What addition to the ordinary solvents is usually made when extracting Glycyrrhiza? Why is this addition made? (4) How would you distinguish certainly whether Russian or Spanish Licorice had been used in the preparation of Pulvis Glycyrrhizæ Compositus? (5) How would you distinguish in a sample of powdered senna whether it was made from the Alexandrian or Indian leaves?

D—(1) The U. S. Pharmacopœia mentions twenty-five preparations called "Spirits." How are they chiefly prepared? (2) Mention one made by chemical reaction. (3) What are their ordinary uses in medicine? (4) Mention five Spirits, giving the official, the English and the common name, if any. (5) Give the mode of preparation, and maximum dose of each of those named.

E—(1) Define Specific Gravity. (2) What is Specific Volume? (3) A piece of Iron weighing 840 grammes is put into a counterpoised beaker, which is then filled with water up to a certain mark above the level of the Iron. The whole is found to weigh 1,280 grammes. The iron is then taken out and water again poured in until the beaker is filled up to the same mark. It now weighs 560 grammes, find the Specific Gravity of the Iron and its weight when under water. (4) At what price per liter would it be necessary to sell official Glycerin, costing 32 cents per kilogramme, to realize 50 per cent. profit on the transaction? (5) How many grammes of alcohol, specific gravity ·820, would a half liter measure hold?

F—(1) Define the term gravimetric analysis. (2) Define the term volumetric analysis. (3) What do the abbreviations T. S. and V. S. mean as used in the U. S. Pharmacopœia? (4) How are the several strengths of V. S. expressed? Give two examples. (5) What is an indicator? Name two indicators. (6) Give the most important solid constituents of normal urine, with their percentages. (7) What disease is indicated when sugar is present in urine? (8) Give two tests for the presence of sugar in urine? (9) What is the formula of urea? (10) Give an outline of the method of estimating it and write the reaction involved.

G—Give a concise description of the physical characteristics of the following, noting color, consistence, taste, odor, etc., of each: (1) Liquor Ferri Chloridi; (2) Acidum Hydrochloricum; (3) Tinctura Capsici; (4) Syrupus Ferri Iodidi; (5) Liquor Arsenii et Hydrargyri Iodidi; (6) Ferri Phosphas Solubilis; (7) Glycyrrhiza; (8) Mistura Ferri Composita; (9) Oleum Gossypii Seminis; (10) Argenti Oxidum.

H—Give the ordinary adult dose of each of the following substances. In case of poisoning by them give an antidote for each and state in each case whether the antidote is Chemical or Physiological: (1) Acid Arsenous; (2) Acid Oxalic; (3) Tartar Emetic; (4) Corrosive Mercuric Chloride; (5) Alcohol; (6) Tincture of Iodine; (7) Morphine Sulphate; (8) Strychnine Sulphate; (9) Acetate of Lead; (10) Atropine Sulphate.

I—(1) Criticise the following prescriptions; state whether you would dispense them as written; if not, why not? if you would, state the method:

℞	Potassii Chlor.	ʒj
	Tr. Guaiaci Ammon.	f℥ss
	Tr. Cinchon. Comp.	fʒii
	Mel Despumat.	f℥j
	Aquæ q. s. ft.	f℥iv
M.		

(2) ℞ Tr. Nucis Vomic. ♏xl
Acid. Nitromuriatic fʒiii
Sig.—Ten drops after each meal.

State your mode of procedure in preparing the following prescription :

(3) ℞ Calcis Sulphuratæ ʒss
Zinci Sulphas ʒss
Aquæ
Aquæ Rosæ āā f℥ii
M.—Sec. art. et fit. mist.
S.—For external use.

K—(1) Write a prescription for a f℥iv Cough Mixture for an adult, using unabbreviated official names. Let it contain proper doses in each dessertspoonful of codeine sulphate, muriate of ammonia, bromide of ammonium, syrup of senega and brown mixture. Write such directions as you think proper, and place in a parallel column the approximate metrical equivalents of the quantities you use.

(2) Describe in detail how you would compound the following prescription :

℞ Sulphur Præcipitat. ʒii
Camphoræ gr. x
Tragacanth Pulv. gr. xx
Liq. Calcis
Aquæ Rosæ āā f℥ii
M. Sig.—Apply. Shake well.—DR. D.

The following specimens were placed before the members of the class for recognition during the several examinations :

Pharmacy.

(1) Aqua fœniculi,
(2) Infusum digitalis,
(3) Spiritus ætheris nitrosi,
(4) Syrupus zingiberis,
(5) Adeps benzoinatus,
(6) Pulvis glycyrrhizæ compositus,
(7) Pulvis ipecacuanhæ et opii,
(8) Linimentum chloroformi,
(9) Tinctura aurantii amari,
(10) Extractum gentianæ fluidum.

Chemistry.

(1) Benzinum,
(2) Acidum stearicum,
(3) Magnesii carbonas,
(4) Acetanilidum,
(5) Sodii acetas,
(6) Potassii ferrocyanidum,
(7) Sodii hyposulphis,
(8) Sodii bicarbonas,
(9) Acidum benzoicum,
(10) Aqua chlori.

Materia Medica.

(1) Aconitum,
(2) Digitalis,

Committee.

(1) Aqua chloroformi,
(2) Syrupus acidi hydriodici,

(3) Strophanthus,
(4) Gentiana,
(5) Mentha piperita,
(6) Veratrum viride,
(7) Coca,
(8) Chirata,
(9) Arnicæ flores,
(10) Chenopodium.

(3) Tinctura cardamomi composita,
(4) Extractum ergotæ fluidum,
(5) Antimonii sulphidum,
(6) Acidum benzoicum,
(7) Ammonii chloridum,
(8) Pyrethrum,
(9) Gossypii radicis cortex,
(10) Pilocarpus.

OPERATIVE PHARMACY.

(1) Alcoholmetrical Test.

Estimate the amount of Alcohol in the sample of White Wine; put all calculations on the sheet of paper, with your name and examination number, and put clearly on the paper the letter of the sample estimated.

(2) Emulsion.

Make 100 c.c. of an Emulsion which shall contain 50 per cent. of Cod Liver Oil, by the *English method;* put in a bottle and place a label on the bottle, giving the proportions of each ingredient.

(3) Pills.

Ferrous Sulphate	4 gm.
Potassium Carbonate	2 gm.
Sugar, Powd.	1 gm.
Tragacanth	·25 gm.
Althæa, Powd.	·25 gm.
Glycerin	
Water	āā . 3 drops.

Make 25 pills; coat with silver.

N. B.—The silver leaf will be found in the pill-box.

(4) Suppositories.

Extract of Stramonium Leaves	·50 gm.
Tannic Acid	·50 gm.
Oil of Theobroma	6 gm.

Make six suppositories, by rolling.

(5) Plaster.

Spread a warming plaster (shaped, with round corners), about 4 x 6 inches of plaster surface.

The plaster will be found in the tin dipper.

QUANTITATIVE ANALYSIS.

For the purposes of this examination the class was divided into four sections. The following are the questions presented to one section:

(1) Prepare a liter of decinormal oxalic acid volumetric solution. Why do you employ 6·285 grammes of oxalic acid?

(2) Determine the number of grammes of potassium hydrate contained in 10 c.c. of the potassium hydrate solution on your table.

(3) Determine the number of grammes of sodium hydrate contained in 10 c.c. of the sodium hydrate solution on your table.

(4) What are the reactions which take place in these estimations?

(5) Why is each c.c. of the decinormal oxalic acid volumetric solution equal to the equivalent of sodium hydrate given in your book?

(6) How much normal oxalic acid volumetric solution should be needed to neutralize 27·995 grammes of liquor potassæ containing 5 per cent of potassium hydrate?

(7) How much metallic iron does one gramme of ferric oxide represent?

(8) How much crystallized ferrous sulphate is required to yield 2·5 grammes of ferric oxide?

SEVENTY-SEVENTH ANNUAL COMMENCEMENT.

The exercises connected with conferring the degree of Doctor in Pharmacy and Pharmaceutical Chemist were held at the Academy of Music, Thursday evening, April 14th, at 8 o'clock.

Prayer was offered by Rev. Mervin J. Eckels, D.D.

The degrees were conferred by Charles Bullock, President of the College.

The following received the degree of Doctor in Pharmacy:

Name.	*Subject of Thesis.*	*State.*
Abrams, Frederick Arthur,	*Glycerin,*	Pennsylvania.
Baer, Lemuel Miles,	*Liquor Potassæ,*	Pennsylvania.
Berberich, Herman,	*Piscidia Erythrina,*	Germany.
Berry, Robert Taylor,	*Acidum Aceticum, U.S.P.,*	W. Virginia.
Beyerle, Chas. Wellington,	*Aromatic Sulphuric Acid,*	Pennsylvania.
Bishop, David Kirlin,	*Dilute Hydrobromic Acid,*	Pennsylvania.
Black, Robert Morris,	*Potassium Bromide,*	Pennsylvania.
Booth, Thomas,	*Phenylacetamide,*	Pennsylvania.
Brach, Cornelius,	*Honey,*	Germany.
Bradford, Edward Burton,	*Digitalis,*	New Jersey.
Bready, Wm. Ramsey, Jr.,	*Lactic Acid,*	Pennsylvania.
Brewton, Swain Hoffman,	*Acidum Hydrochloricum Dilutum,*	New Jersey.
Coleman, John Edward,	*Acidum Sulphurosum,*	Pennsylvania.
Cooper, Walter Greenlee,	*Calx Chlorata,*	Missouri.
Cox, Linwood,	*Phytolacca Decandra,*	Pennsylvania.
Dale, David,	*Granulation of Powders for Compressed Pills,*	Pennsylvania.
Decker, Wm. Robert,	*Aqua Hydrogenii Dioxidi,*	Pennsylvania.
Dirmitt, Chas. Walter,	*Quantitative Estimation of Starch,*	Pennsylvania
Dubell, Alexander,	*Dilute Nitro-Hydrochloric Acid,*	New Jersey.
Eastlack, Walter Forrest,	*Cocaine and the Erythroxylon Coca Plant,*	Pennsylvania.
Evans, Abner Thomas,	*Labarraque's Solution,*	Pennsylvania.
Evans, Samuel, Jr.,	*Solution of Ferric Chloride,*	Ohio.
Farrow, Fred. Reeves,	*The Future of American Pharmacy,*	Delaware.
Fisher, Samuel Keim,	*Preservation of Syrup of Ferrous Iodide,*	Pennsylvania.
Friebely, Harry Eugene,	*Tinctura Ferri Chloridi,*	Pennsylvania.
Funk, Robert Rowland,	*Unguentum Aquæ Rosæ.*	Maryland.
Gladhill, James White,	*Castanea Dentata,*	Pennsylvania.

Name.	*Subject of Thesis.*	*State.*
Groff, Harry Musselman,	*Ananassa Sativa,*	Pennsylvania.
Grunden, Percival Edward,	*Aqua Chlori, U.S.P.,*	Pennsylvania.
Guth, Herbert Wallace,	*Urine Analysis,*	Pennsylvania.
Haus, Ralph Leonard,	*Dilute Hypophosphorus Acid,*	Pennsylvania.
Heintzelman, Jos. August, Jr.,	*Syrup of Ferrous Iodide,*	Pennsylvania.
Heverly, Fred. Chase,	*Rhus Toxicodendron, U.S.P.,*	Pennsylvania.
Hoffman, Wm. Anton,	*Stramonium,*	Pennsylvania.
Huntington, Joseph,	*Seidlitz Powders*	Pennsylvania.
Jenkins, Frank Heiston,	*Liquor Potassii Arseniti,*	Pennsylvania.
Kain, John Kauffman,	*Podophyllum,*	Pennsylvania.
Keen, George Carll,	*Fluid Extract of Buchu,*	New Jersey.
Keenan, John Joseph,	*Examination of Official Nitric Acid,*	Pennsylvania.
Keim, Joseph Paxson,	*Chlorophyll,*	Pennsylvania.
Kepner, Weldon Stover,	*Guarana,*	Pennsylvania.
King, James David,	*Spiritus Ætheris Nitrosi*	Pennsylvania.
Kirby, Frank Brennand,	*Acidum Tartaricum,*	Pennsylvania.
Krewson, Wm. Egbert, Jr.,	*Larrea Mexicana,*	Pennsylvania.
Latchford, Orwan Luther,	*Acidum Aceticum*	Pennsylvania.
Lee, Walter Evan,	*Coca,*	New Jersey.
Lindig, Charles Warren,	*Scaled Salts, U.S.P.*	Pennsylvania.
Luebert, August Gustav,	*Hydrangea Paniculata var. Grandiflora,*	Pennsylvania.
McCleary, Harry Walter,	*The Successful Pharmacist,*	Pennsylvania.
Metzler, Walter Scott,	*Ipecacuanha,*	Ohio.
Middleton, Claude Ruoff,	*Acidum Hydrocyanicum Dilutum,*	Pennsylvania.
Mills, John Leopold,	*The Druggist and His Time,*	Ohio.
Monaghan, Thos. Francis,	*Vegetable Dissemination,*	Pennsylvania.
Morell, Charles Joseph,	*Syrupus Acidi Hydriodici,*	Pennsylvania.
Morgan, Frank Wm.,	*Cotton Root Bark,*	Louisiana.
Mountain, Lloyd Lott,	*Progress of Pharmacy in America,*	Pennsylvania.
Parse, Andrew Connet,	*Glycerinum,*	New Jersey.
Preston, Gilbert Kent,	*A Species of Commelina,*	Pennsylvania.
Putt, Milton Thomas,	*Cinchona Bark,*	Pennsylvania.
Raker, John Wilson,	*Camphor,*	Pennsylvania.
Richardson, James,	*Tinctura Iodi,*	Ontario, Can.
Ringer, Louis Johnson,	*Fresh Emulsion of Cod Liver Oil,*	Maryland.
Rinker, Henry Paul,	*Liquor Potassæ.*	Pennsylvania.
Ritz, Charles August,	*Potassii et Sodii Tartras,*	Pennsylvania.
Rose, Frank, A. B.,	*Gallic Acid,*	Pennsylvania.
Ross, Annie Catherine,	*Animal Substances,*	Pennsylvania.
Schlauch, Theodore Storb,	*Acidum Phosphoricum Dilutum,*	Pennsylvania.
Seiberling, Joseph Dallas,	*Structure of Gelsemium,*	Pennsylvania.
Sheitz, Lloyd A.,	*Nux Vomica,*	Pennsylvania.
Shemp, Russell Nicholas,	*Althæa,*	Pennsylvania.
Sieber, Isaac Grafton,	*Iron,*	Pennsylvania.
Slobodkin, Rose,	*Syrupus Ferri Iodidi,*	Russia.
Smith, Benjamin James,	*Opium and its Preparations,*	New Jersey.
Snavely, Clarence Osborne,	*Thymol Sulphonic Acid,*	Pennsylvania.

Name.	*Subject of Thesis.*	*State.*
Snyder, John Paul,	*Tincture of Ginger*,	Pennsylvania.
Steinmetz, William Baer,	*Emulsions*,	Pennsylvania.
Stimus, Howard George,	*Honey*,	New Jersey.
Strawinski, Jacob Franklin,	*A Pharmaceutical Sieve*,	Pennsylvania.
Swartley, Harry Mahlon,	*Moschus*,	Pennsylvania.
Thompson, Henry Merrill,	*Sodii Bicarbonas*,	Pennsylvania.
Tomlinson, George Walton,	*Liquor Sodæ*,	Pennsylvania.
Troth, Ernest Augustine,	*Sulphuric Acid*,	New Jersey.
Waldner, Herman Theodore,	*Mistura Glycyrrhiza Composita*,	Pennsylvania.
Walter, William Bell,	*The Collodions*,	Pennsylvania.
Wilt, Geo. Washington, Jr.,	*Ammonia Water*,	Kentucky.
Winkler, Oscar Charles,	*Poisons of the U.S.P.*,	Pennsylvania.
Winslow, John Hayes,	*Nutgall*,	New Jersey.

The following received the degree of Pharmaceutical Chemist:

Name.	*Subject of Thesis.*	*State.*
Albert, Henry Clay,	*Lime Water and Lime Water Tablets*,	Kentucky.
Beane, George Ridenour,	*Menthol*,	Pennsylvania.
De Haven, Ida Valeria,	*Digestive Ferments*,	New Jersey.
Greer, Mary Caroline,	*Stramonium*,	Pennsylvania.
Kyser, George Herbert,	*Gossypium*,	Alabama.
Mathers, Grace,	*Colchicum*,	Pennsylvania.
Monroe, William Robeson,	*Aralia Californica*,	California.
Shwab, George Augustus,	*The Mexican Ava*,	Tennessee.
Thompson, Henry Kirk,	*Vallet's Mass*,	Pennsylvania.
Underwood, James Harris,	*Calomel*,	New Jersey.

The following received the degree of Graduate in Pharmacy:

Name.	*Subject of Thesis.*	*State.*
Brookes, Lulu,	*Kola*,	Texas.
Fleming, John Halbert,	*Adulterations*,	Pennsylvania.
Jacoby, William Lawless,	*Oleum Ricini*,	Pennsylvania.
Koehler, George,	*Lard*,	Pennsylvania.
Konover, Harold Doble,	*Artificial Light*,	New Jersey.
Lincoln, George Washington,	*Glycerin*,	Pennsylvania.
Pasold, Julius Martin,	*Calcium*,	Illinois.
Toelke, Charles,	*Disinfectants*,	Pennsylvania.
Weiss, Hervey Beale,	*A Cold Cream Apparatus*,	Pennsylvania.
Yates, John Julius,	*Class of Algae*,	Delaware.

Special certificates for a two years' course in general, applied and analytical chemistry were awarded to:

Cheney, Millwood C., New York.
Dirmitt, Charles Walter, Pennsylvania.
Heckeroth, William Conard, Pennsylvania.
Matusow, Harry, Ph.G., Russia.
Post, Edward Meigs, Ph.G., New Jersey.
Rowe, William C., Ph.G., Pennsylvania.
Suhr, Charles Louis, Pennsylvania.

STATES AND COUNTRIES REPRESENTED BY THE GRADUATING CLASSES.

Alabama	1	Maryland	2	Russia	2
California	1	Missouri	1	Tennessee	1
Delaware	2	New Jersey	14	Texas	1
Germany	2	New York	1	West Virginia	1
Illinois	1	Ohio	3		
Kentucky	2	Ontario	1	Total	114
Louisiana	1	Pennsylvania	77		

AWARD OF PRIZES.

The John M. Maisch Memorial Prize of a Zentmayer microscope, offered by the family of the late Prof. John M. Maisch, for original histological work on American plants, was awarded to Gilbert K. Preston. The following graduates received honorable mention in connection therewith: Frank W. Morgan and Joseph D. Seiberling.

The William B. Webb Memorial Prize, consisting of a gold medal and certificate, offered by Mrs. Rebecca T. Webb, for the highest general average in the examinations on committee, operative pharmacy and specimens, was awarded to James D. King, with honorable mention of Andrew C. Parse.

A Prize of a Gold Medal, offered by Prof. Joseph P. Remington, for an original device or contrivance useful in practical pharmaceutical work, was awarded to J. Franklin Strawinski.

The Chemical Prize of $25 in gold, offered by Prof. Samuel P. Sadtler, for knowledge of quantitative chemical analysis, was awarded to Joseph Huntington, with honorable mention of George A. Shwab.

The AMERICAN JOURNAL OF PHARMACY Prize of $25, offered by Prof. Henry Trimble, for a paper (not intended as a thesis) involving original work done in the Chemical Laboratory, was awarded to Charles W. Dirmitt.

The Materia Medica Prize of $25, offered by Prof. Clement B. Lowe, for the recognition of rare drugs by the aid of the simple microscope only, was awarded to Andrew C. Parse. The following graduates received honorable mention in connection therewith: David Dale, George A. Shwab, Fred. R. Farrow, and Jacob F. Strawinski.

The Maisch Prize of $20, offered by Mr J. H. Redsecker, of Lebanon, Pa., was awarded to J. Franklin Strawinski. The following graduates received honorable mention in connection therewith: David Dale, Fred. R. Farrow and Geo. A. Shwab.

The Operative Pharmacy Prize of $20 in gold, offered by Prof. Joseph P. Remington, for the best examination in operative pharmacy, was awarded to Theodore S. Schlauch. The following graduates received honorable mention in connection therewith: Robert T. Berry, John E. Coleman, Harry E. Friebely, Frank W. Morgan and James Richardson.

The Theoretical Pharmacy Prize of a fine Troemner agate prescription balance, offered by Mr. Mahlon N. Kline, of Philadelphia, was awarded to Joseph Huntington. The following graduates received honorable mention in connection therewith: Orwan L. Latchford, Andrew C. Parse and George A. Shwab.

The Robinson Chemical Prize, consisting of a gold medal and certificate, offered by Mr. James S. Robinson, of Memphis, Tenn., for the best exami-

nation in general and analytical chemistry, was awarded to Joseph Huntington.

The valedictory address to the graduating class was delivered by Prof. Samuel P. Sadtler.

The Professor's farewell supper to the graduates was given on Wednesday evening, April 13th, in the Museum of the College. The Officers and Trustees of the College were present, and also a number of invited guests. Prof. Remington was master of ceremonies, and the evening passed pleasantly in disposing of the menu, speech-making, etc.

MINUTES OF ANNUAL MEETING OF THE COLLEGE.

March 28, 1898.

The annual meeting of members of the College was held this day. Charles Bullock presided. The Secretary presented written resignations of three members. The Committee on Deceased Members reviewed the personal and business histories of Thomas J. Husband and Alfred B. Taylor, embodying in the same eulogistic remarks: That of Alfred B. Taylor was published in the April number of this JOURNAL, the other is as follows:

THOMAS J. HUSBAND.

Thomas J. Husband was born in Harford County, Md., in 1813. Coming to Philadelphia when a boy, he entered the drug store of Thomas McClintock, a well-known Philadelphia druggist, whose store was at the northwest corner of Fifth and Callowhill Streets. As an apprentice he gave abundant promise of future usefulness in his profession. He attended the Philadelphia College of Pharmacy, graduating with honor in the Class of 1833. He spent much time in working upon his thesis, the subject being: "Galipea Officinalis." This was published in the AMERICAN JOURNAL OF PHARMACY for October, 1833. He subsequently joined the College, becoming a life member, and for several years served on the Board of Trustees.

For more than fifty years he conducted a successful retail business at the northwest corner of Third and Spruce Streets, but his name is inseparably connected with the preparation known all over the country as "Husband's Magnesia." The enormous sale of this household remedy was due to his accurate knowledge of the physical properties of magnesia, and to the careful and judicious management which he exercised in putting it upon the market.

His qualities of mind, his education and training, and above all, his scrupulous honesty, had a great influence in establishing for more than one generation the continued demand for the magnesia made by Husband. He took a great interest in his apprentices, and none left his store without being thoroughly imbued with the principle that honesty, industry and faithfulness were incumbent upon all who desired to serve their Creator and their fellowmen. These sterling qualities endeared him to all who came in contact with him.

He relinquished his active interests in the retail drug business a number of years ago, but continued the manufacture of magnesia at his laboratory at Byberry, Twenty-third Ward, Philadelphia, until the time of death.

Thomas J. Husband was a life-long member of the Society of Friends, attending the meeting at the northeast corner of Ninth and Spruce Streets.

He died on January 21, 1898, in the eighty-fifth year of his age, and his passing away was as peaceful as his long life had been useful. Thus has been gathered home another one of the members of the Philadelphia College of Pharmacy who have by their example and consistent walk shed lustre upon their *Alma Mater*, and his loss is mourned by all of those in the City of Philadelphia who had the happiness to come within the sphere of his influence.

JOSEPH P. REMINGTON,
JOSEPH W. ENGLAND,
C. CARROLL MEYER.

The annual meeting being the occasion of statements by the officers and the standing committees, reports were received in the following order. Committee on Publication reported the regular issue of the AMERICAN JOURNAL OF PHARMACY during the year. Sample copies were sent out with each issue, and at the beginning of the new year a number of circulars were also distributed. One gratifying feature as showing the usefulness of the JOURNAL for reference was the unusual number of inquiries for back numbers. The other statements in the Report corresponded pretty closely to those given at the last annual meeting.

The Report of the Editor was as follows:

This report includes the issues of April 1, 1897, to March 1, 1898. The total number of pages published was 672, a decrease of 36 pages from the same period last year; the average for each of the twelve numbers was 56 pages, against 59 last year, and 53½ the preceding year.

The total number of original papers published during the year was 61, occupying 298 pages; these papers were prepared expressly for the JOURNAL, and do not include abstracts, translations or editorials.

The number of authors contributing was 40, 19 of whom were not members of the College. It will thereby be seen that nearly one-half the contributors were non-members. A number of members contributed more than one paper. Original papers were received from contributors residing in Sweden, Trinidad, Mexico and Germany; reprints were received from nearly every country in Europe, and from Australia, those from the latter country have in many instances been published, because they contain information concerning the chemistry of plants not elsewhere obtainable in this country.

It is evident that the interest in the JOURNAL is not merely local in character, but that it exists in every quarter of the globe.

The Librarian submitted the following report:

The Librarian respectfully reports that there have been added to the Library during the past year 165 volumes. Among these are many valuable works relative to materia medica and pharmacognosy purchased from the estate of the late Prof. E. S. Bastin.

There has been expended the sum of $365 for books and $74.18 for binding.

The growth of the Library during the last few years has been so great that it will ere long be necessary to provide additional case-room.

Respectfully submitted,

THOS. S. WIEGAND, *Librarian.*

The following is a summary of the Curator's report:

Your Curator would respectfully report that the Museum is in good condition, and has received a number of valuable additions during the year. Among those who contributed were: Charles Bullock, Richard M. Shoemaker, F. B. Kilmer, Smith, Kline & French Co., John Wyeth & Bro., Frederick Stearns & Co., McIlvaine Bros. and Thos. S. Wiegand, who presented a collection of various metals, such as zinc, antimony, copper, manganese, etc.

The most valuable accession to the Museum, however, has been two collections of rare and costly chemical compounds, by Merck & Co., of New York.

Yours respectfully,

J. W. ENGLAND, *Curator*.

The several reports were, on motion, received, and offered to be placed on the minutes.

Nominations having been made for officers of the College and for three trustees (the latter to be elected for the term of three years next ensuing), the following-named persons were unanimously chosen:

President, Charles Bullock; First Vice-President, William J. Jenks; Second Vice-President, Howard B. French; Corresponding Secretary, A. W. Miller; Recording Secretary, William B. Thompson; Treasurer, James T. Shinn; Librarian, Thos. S. Wiegand; Curator, Jos. W. England; Trustees for three years: Jos. L. Lemberger, Samuel P. Sadtler, William L. Cliffe; Publication Committee: Henry N. Rittenhouse, Samuel P. Sadtler, Jos. W. England, Wallace Procter; Editor, Henry Trimble.

On motion, the meeting adjourned.

WILLIAM B. THOMPSON, *Secretary*.

MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, April 19, 1898.

The regular Pharmaceutical Meeting was held in the Museum of the College at 3 P.M. Joseph W. England presided. The minutes of the previous meeting were allowed to stand as published.

The presentations of specimens being next in order, attention was directed to a specimen of the fruit of the double cocoanut palm, which was received from Dr. J. J. Lemon, of Biloxi, Miss., through the kindness of F. W. Morgan. The original habitat of the plant is given as the Seychelle Islands, and it is distinguished botanically as Lodoicea seychellarum. Owing to the firmness of the shell covering of the fruits, they are carried uninjured many hundreds of miles by ocean currents, and in this way the plant has been propagated in many of the islands of the Indian and Pacific Oceans.

On motion it was ordered that a vote of thanks be extended to Dr. Lemon for the interesting specimen sent by him.

Dr. C. B. Lowe was the first speaker on the programme, and read an interesting paper on "Larrea Mexicana." (See page 235.) The paper contains some suggestions which, it is hoped, will lead to a further investigation as to the therapeutic properties of the plant.

A valuable paper on "The Detection of Mucilage in Plants" was presented by Prof. Henry Kraemer. This was a report of a micro-chemical examination

of a number of plant specimens for the purpose of detecting the presence of mucilage. In some previous work, on the pansy, the author found that he was able to detect this substance by means of a solution of methylene blue. Since then he has applied the test to various specimens and found it to be quite characteristic.

A "Note on the Common Names of Plants," by Prof. J. U. Lloyd, was read by Professor Trimble. (See page 234.) This subject was the occasion for considerable discussion. Professor Trimble said that many instances could be cited where plants have more scientific names than common names, which furnishes another reason for using the common names.

Professor Kraemer said that he saw no chance to lessen the number of synonyms while so many separate schools of taxonomy exist.

Others taking part in the discussion were the chairman, Professor Lowe and Mr. E. M. Boring.

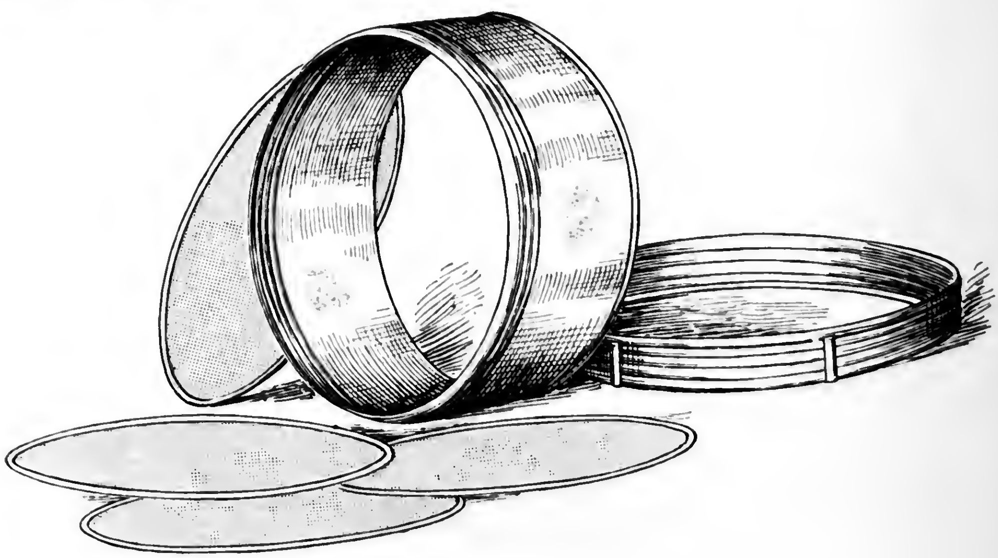


FIG. 1—Pharmaceutical Sieve, with the several parts detached.

A new form of pharmaceutical sieve was exhibited by Professor Trimble, in behalf of the inventor, J. Frank Strawinski, P.D., a member of the recent graduating class. The writer stated, in his description of the apparatus, that the idea of producing a sieve which would lessen the liability to contamination of powdered drugs was suggested to him while attending the lectures on comminution. The accompanying illustrations show the several parts of the sieve in *Fig. 1*, and in *Fig. 2* its appearance when these are put together for use. The body or frame of the sieve is made of brass, which is tinned on the inner surface. At the base of the frame is a coarse threading, and over this a collar containing the sieve-plate is screwed. On the exterior of the collar are five finger-holds, so that it may be adjusted quite firmly. The sieve-plates are made separately, and, in adjusting the apparatus, all that is necessary is to place one of these of the desired mesh in the collar before attaching the latter to the frame. The model constructed by the author has five sieve-plates, each of the proper mesh for producing the degrees of fineness specified in the Pharmaco-

pœia. Several points of superiority are claimed by the author for his invention. These are durability, less liability to contamination, compactness, etc.

An informal talk by Professor Kraemer on "A Recent Botanical Trip to Wilmington, N. C.," was an instructive as well as an interesting feature of the meeting. A number of specimens were exhibited in connection therewith. Professor Kraemer said that the flora of North Carolina is remarkable in many ways. One thing which he noticed is the wantonness with which the inhabitants carry on the destruction of trees. He also said that the State appears to be the dividing-line between Northern and Southern floras. Within its limits are to be found several species of pine which also extend into Northern latitudes, while at the same time are found several species of palm, the members of this group being for the most part found in tropical countries.

The following list includes most of the plants described: (1) Insectivorous plants—Dionaea muscipula, Ellis; Drosera brevifolia, Pursh; D. longifolia, L.; Pinguicula lutea, Walt.; P. elatior, Mx.; Ulneularia inflata, Walt.; U. subulata, L.; Sarracenia flava, L.; S. purpurea, L.; S. rubra, Walt. (2) Climbing

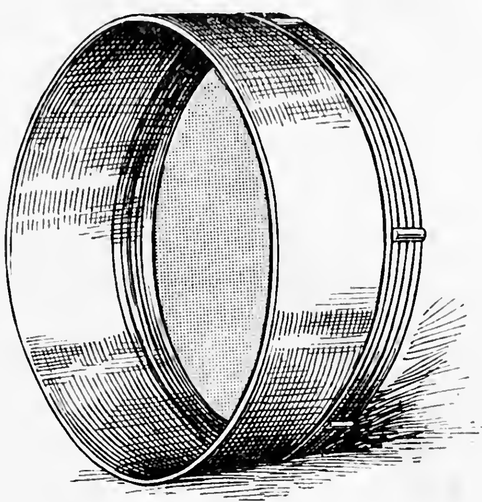


FIG 2.—Sieve complete.

plants—Bryonia capreolata, L. (Cross vine); Gelsemium sempervirens, Ait.; Tecoma radicans, Juss.; Smilax tamnoides, L.; S. laurifolia, L.; S. Walteri, Pursh.; Lonicera sempervirens, Ait; Vitis vulpina, L. (3) Trees, shrubs, etc.—Pinus australis, Mx. (Long-leaf pine); P. taeda, L. (Loblolly or old field pine); Taxodium distichum, L. (Cypress); Hicoria glabra, L. (Pignut); Juniperus virginiana, L.; Quercus cinera, Mx.: Q. cataesbaei, Mx.; Q. nigra, L.; Q. obtusifolia (?); Q. myrtifolia (?); Q. phellos, L.; Q. virginiana and variety maritima; Q. aquatica, Cates; Q. alba, L.; Acer rubrum, L.; Cornus florida, L.; Ilex Dahoon, Walt. (Dahoon holly); I. cassine, L. (Yapon); Nyssa multiflora (Sour gum); Melia azederach, L.; Magnolia glauca, L.; Salix nigra; Sabal Palmetto, Rand. (Palmetto); Sabal Adansonii, Guerns.; Yucca filamentosa, L. (Bear grass); Y. gloriosa, L. (4) Other plants—Tillandsia usneoides, L.; Cabomba caroliniana, Gray; Viola villosa, Walt.; Geranium molle, L.; Lupinus diffusus, Nutt.; Opuntia Rafinesque, Engelm.; Chaptalia tomentosa, Vent.; Iris verna, L.; Alium striatum, Jacq.; Asarum arifolium.

In his remarks on the insectivorous plants, Professor Kraemer said that the Venus' fly-trap grows naturally near Wilmington, but that it is likely to become exterminated. In observing the habits of the plant, he noticed that other portions of the leaf than the hairs are sensitive—which observation appears not to have been noted heretofore.

A hearty vote of thanks was tendered Professor Kraemer for his interesting talk.

On motion, the meeting adjourned.

THOS. S. WIEGAND,
Registrar.

NORTH CAROLINA PHARMACEUTICAL ASSOCIATION.

The Nineteenth Annual Meeting of the North Carolina Pharmaceutical Association will be held at Charlotte, beginning Wednesday, May 18th. The first session will be called at 10.30 A. M.

Headquarters will be at the Central Hotel, the special rate being $2 per day. The railroad rate will be one fare round-trip. Tickets on sale May 16th expiring with the 21st.

As usual the North Carolina Board of Pharmacy will hold its meeting, for the examination of applicants for license, at the same place at 9 A.M., on May 17th, one day prior to the meeting of the Association, when candidates must be present.

Professors Howell, Baskerville, and Mangum, of the University School of Pharmacy, have offered prizes for the best examination in Pharmacy, Chemistry and Materia Medica, applicable to all who may be examined.

Candidates, in fact all druggists, are entitled to the same railroad and hotel rates as members of the Association.

Those desiring to contribute papers should report their titles to W. G. Thomas, Louisburg, Chairman of Committee on Papers and Queries, if possible in advance of the first session of the Association.

Inquiries in regard to the meeting of the Board of Pharmacy should be addressed to the secretary, William Simpson, Raleigh.

H. R. HARNE, *Secretary.*

ANNUAL MEETING AND RECEPTION OF THE ALUMNI ASSOCIATION.

The Thirty-fourth Annual Meeting of the Alumni Association of the Philadelphia College of Pharmacy was held in Alumni Hall on Tuesday afternoon, April 12th, with the President, Henry L. Stiles, in the chair.

Following the Annual Address of the President, reports from the Treasurer and Secretary were read, the latter being to the effect that 107 new members had been enrolled, making an increase of 90 during the year. The number of deceased members for the same period was 17, making the total number of alumni 2,839.

After the reports had been read and adopted, the election of officers for the ensuing year was held, and resulted as follows:

President, James C. Perry, Class of '91; First Vice-President, F. Wm. E. Stedem, '82; Second Vice-president, Theodore Campbell, '93; Treasurer, William L. Cliffe, '84; Secretary, William E. Krewson, '69; Corresponding Secretary, Cornelius E. Spencely, '78; Board of Directors for three years: Joseph W. England, '83; H. L. Stiles, '85; George Y. Wood, '94; William G. Nebig, '86; for two years, Dr. J. Louis D. Morison, '88; Prof. Henry Trimble, '76; William N. Stem, '73; David H. Ross, '78; for one year, Wallace Procter, '72; C. Carroll Meyer, '73; William A. Bullock, '86; John H. Hahn, '81.

The thirty-fourth Annual Reception of the Association, to the seventy-seventh graduating class, was tendered on the evening of the same day, in the College Museum.

After music by Bastert's Orchestra, introductory remarks were made by the President of the Alumni Association, Henry L. Stiles, '85.

Secretary William E. Krewson called the roll of those who had been elected to membership during the fiscal year 1897–98.

The Alumni Gold Medal to the member of the graduating class receiving the highest general average was awarded to Joseph Huntington, and was presented by Joseph W. England.

The prize certificates to the members of the graduating class receiving the highest averages were awarded as follows: Pharmacy, Joseph Huntington, Philadelphia, by Frank G. Ryan; Chemistry, George Augustus Shwab, Nashville, Tenn., by Frank K. Moerk; Materia Medica, Andrew Connell Parse, Flemington, N. J., by Dr. C. B. Lowe; General Pharmacy (Committee), Frank William Morgan, New Orleans, La., by Wallace Procter; Operative Pharmacy, Theodore Storb Schlauch, New Holland, Pa., by Theodore Campbell; Analytical Chemistry, Gilbert Kent Preston, Philadelphia, by Josiah C. Peacock; Pharmacognosy (Specimens), James David King, Easton, Pa., by Dr. J. Louis Morison.

The prize testimonial to the first course student passing the best examinations was awarded to Harry Lionel Meredith, of Hagerstown, Md., by James C. Perry. The prize testimonial to the second course student passing the best examination was awarded to Edward Bancroft Rogers, of Mount Holly, N. J., by F. Wm. E. Stedem.

The class oration was delivered by Clarence O. Snavely; the history by A. Gustav Luebert; the poem by Frederick R. Farrow, and the prophecy by David Dale.

NOTES AND NEWS.

An explosion in a Drug Store in New York, which occurred on April 6th, was of extraordinary character and great violence. This was the result of the compounding of a prescription of potassium chlorate and sodium salicylate. As a result of mixing the ingredients in a mortar the shop was badly wrecked—the damage being estimated at $1,500. The clerk who was doing the mixing was seriously injured.

The Mucilage Cells of Opuntia have been made the subject of a recent study by Longo[1], who states that they occur distributed through the fundamental parenchyma of all members of the plant, that their mucilage does not result from a transformation of the cell wall, but is a direct product of their proto-

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[1] *Annuario del R. Ist. Bot. di Roma*, 7, pp. 44-57, pl. 2.

plasm, and that their function is that of a water tissue. The same author has also[1] studied certain crystal and mucilage cells which are found in the branches and fruit of Platopuntias, though absent from the Cylindropuntias.—*The American Naturalist*, March, 1898.

In a paper on "*The Spruces of the Adirondacks*," read before the Albany Institute in November, 1897, Professor Peck states that, though until recently only two species of Picea were credited to the Adirondack region, there is now good evidence of the presence there of four species: P. canadensis, the white spruce, P. Mariana, the black spruce, P. rubra, the red spruce, with a dwarf variety, P. rubra pusilla, and what is held to be a new species, the swamp spruce, P. brevifolia, with a dwarf variety, P. brevifolia semiprostrata.—*The American Naturalist*, March, 1898.

Digestion in Pitcher Plants.—It has been variously claimed that the digestion of proteids in the pitchers of Nepenthes is due to a digestive ferment secreted by them and to the action of bacteria growing in their secretion, Professor Vines, in the *Annals of Botany*, for December, 1897, gives additional corroboration of the former claim, since he shows that the secretion digests fibrin in the presence of 1 per cent. hydrocyanic acid, and that its enzyme retains digestive activity when kept for several weeks in pure glycerin. His studies do not reach to the secretion of the necessary acid, which, in one species at least, is present in the liquid of unopened pitchers, and therefore is not the result of stimulation by the presence of foreign bodies.—*The American Naturalist*, March, 1898.

The Rice Crop of India is reported as the largest crop grown, and furnishes the principal food of nearly 300,000,000 people in that country, while entering largely into the food of the people of Egypt and Asia, besides the quantities consumed in other countries.

The total average yield of the crop for the past ten years has been about 20,500,000 tons, and the value of that exported, after supplying the home consumption, has been about $35,000,000 annually.

The crop of 1895 was much below the average, being especially deficient in Bengal, which produces about three-fourths of the crop of India (including Burma); and the following extract from the final forecast on the crop of that year, issued from the Statistical Bureau in February, 1896, states the particulars in regard to the crop in the three great rice-producing provinces—Bengal, Burma and Madras:

The yield of the crop (1895) is estimated at 20,277,050 tons, more than three-fourths of the quantity representing the production in Bengal, which is estimated at a fraction less than 15,400,000 tons. The return in both Madras (1,950,000 tons) and Burma (2,400,000 tons) is materially larger than last year; but the yield in Bengal is nearly 24 per cent. less, and the total yield of these three provinces is expected to be 18½ per cent. smaller than last year and 21 per cent. below the average.

During the past five years the following countries have taken the rice exported in the order named: Egypt, Asia, the United Kingdom, Ceylon, Straits Settlements and Arabia, while much smaller quantities have gone to Germany and other countries, the United States being among the lowest on the list, in 1895 taking 3,500 tons, but none last or this year, owing, perhaps, to the high price in India and to the increased production in this country.—*Consular Reports*, Vol. LVI, p. 409.

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[1] *Loc. cit.*, pp. 79-83, pl. 8.

THE AMERICAN
JOURNAL OF PHARMACY.

JUNE, 1898.

EXAMINATION OF COMMERCIAL SAMPLES OF AMYL NITRITE AND SPIRIT OF NITROUS ETHER, AND A NEW METHOD FOR THEIR VALUATION.

By Carl E. Smith.

Report from Research Committee D, Section II, of the Committee of Revision of the U. S. Pharmacopœia.

As the ethereal nitrites are exceedingly unstable bodies, gradually deteriorating, notwithstanding all possible care taken in their preservation, it would seem incumbent upon the dispensing pharmacist, not only to prevent deterioration as much as possible by proper precautions, and to make or purchase these preparations only in such quantities as can be used in a short time, but also to determine from time to time the extent of change that has taken place, as indicated by loss of strength, increase of acidity, etc. An article purchased from a reliable firm, or made by the pharmacist himself, may meet all requirements when made or received, but, after having been kept some time, it will have suffered sufficient loss of strength to require an increase of dose, if not to be rejected entirely, and this loss cannot be even approximately determined without suitable quantitative tests. That such tests are necessary, is shown by the frequent reports in the journals upon these substances purchased in drug stores, and found nearly always much below the official standard, in some cases even entirely devoid of nitrite.

Many pharmacists might possibly be persuaded to test their supplies of amyl nitrite and spirit of nitrous ether, if they were not deterred by a seeming, though not real, complexity of the present

U.S.P. method of assay, and by the necessity of either purchasing a special apparatus, a nitrometer, or else taking the trouble to improvise one from other apparatus at hand. Hence, the control of the strength of these preparations, under present conditions, is restricted almost entirely to manufacturing and analytical laboratories. It is a desideratum, therefore, for the pharmacist to be in possession of a method of valuation that does not require special apparatus and, in other respects, is adapted to the requirements of the dispensing pharmacist. In a search for such a method, the writer has examined, without success, those of the older existing methods of titration that appeared most promising, but has succeeded in adapting a new method, very recently proposed for alkali nitrites, to the estimation of ethyl and amyl nitrite. It is readily applied by any one who is acquainted with the rudiments of volumetric analysis, and requires only the ordinary apparatus employed in such work. Experiments seem to show also, that it is capable of greater accuracy than the gasometric method, which is in general use at present. Before describing it fully, an account of the experiments made in connection with the other methods tried will be given.

The U.S.P. method is essentially that of A. H. Allen (Ph. J. Tr., 1885, ser. 3, vol. 15, p. 674), who makes use of the following reaction, by measuring the nitric oxide formed:

$$2C_2H_5NO_2 + 2KI + 2H_2SO_4 = 2C_2H_5OH + N_2O_2 + I_2 + 2KHSO_4.$$

This reaction had previously been employed by D. B. Dott, who recommended titrating the liberated iodine with thiosulphate. This procedure was soon found unreliable by Allen and others, and was superseded by Allen's gasometric modification. The cause of inaccuracy is the instant oxidation of nitric oxide (N_2O_2) on contact with air, to nitrogen tetroxide (N_2O_4), which continues to set free iodine from the hydriodic acid in solution, and causes the result to be much too high. Mr. Dott then proposed a modification (Ph. J. Tr., (3) vol. 15, p. 697), in which air was to be excluded by generating carbon dioxide within the vessel in which the operation was performed, but this also failed to find the approval of others. It has further been recommended to conduct the operation in an atmosphere of coal-gas, and accurate results have been reported by the employment of this, but the necessity of having a specially constructed apparatus and the care and practical skill required to obtain serviceable results

have prevented this modification from becoming popular. D. Walker (*Am. Drug.*, 1896, p. 79) reported results agreeing fairly well with others obtained by nitrometer, through substitution of acetic for sulphuric acid in Dott's method and without precautions to exclude air. L. A. Kessler (AM. JOUR. PHAR., 1897, p. 307) found this unsatisfactory because of liability of giving too high results.

The conflicting statements regarding this method in its various modifications induced the writer to make some experiments to determine if it could not in some way be adapted to the use of the pharmacist for approximate estimations.

When spirit of nitrous ether, solution of potassium iodide and dilute sulphuric acid were mixed in a flask with access of air, in the same proportions as in the gasometric method, the quantity of iodine liberated in a few moments would be two or three times as much as was required by the nitrite present; when the spirit was diluted with water before admixture with the reagents, the liberation of the iodine was slower, but also greatly in excess of the theoretically required amount, and, after decoloration, the solution would rapidly become brown again from further liberation of iodine.

When access of air was prevented by a layer of liquid paraffin on the surface, the reaction was not complete in any reasonable time, only one-half to two-thirds of the actual amount of nitrite being indicated. At the same time a portion of the iodine dissolved in the paraffin, thus in part escaping titration.

Dott's later method consists in mixing 10 c.c. each of a 10 per cent. solution of potassium iodide, of a 15 per cent. solution of potassium bicarbonate, of rectified spirit and 5 c.c. of spirit of nitrous ether, then adding 10 c.c. of dilute sulphuric acid and, after a half hour, titrating with thiosulphate. Following these directions in assaying a spirit that gave 4·9 per cent. of ethyl nitrite by the gasometric method, the results ranged from 2·6 to 3·2 per cent., and when the solutions were left undisturbed for a few moments after titration of the iodine, iodine was liberated at the surface, showing it to be effected through external influence.

With the use of acetic instead of sulphuric acid, as proposed by Walker, the liberation of iodine was still slower, in the case of protection from the influence of the air by means of liquid paraffin. Without this protection it was considerably faster, but due nearly as much to the oxidizing influence of the air as to reaction within

the solution. While it is possible that, by carefully maintaining all conditions of time, dilution, surface exposure, etc., results agreeing approximately with those of the gasometric method may be obtained, it is the writer's experience that parallel experiments by both methods, and considerable practice are required to accomplish this.

The late Prof. Charles O. Curtman published (*Ph. Rundschau*, 1892, p. 156) a modification of Eykman's gasometric method, which depends upon the following reaction:

$$2C_2H_5NO_2 + 2\,FeSO_4 + H_2SO_4 = N_2O_2 + 2C_2H_5OH + Fe_2(SO_4)_3.$$

The modification consists in expelling the nitric oxide by boiling, and estimating the quantity of ferric salt formed in the reaction, by adding potassium iodide and titrating the liberated iodine with thiosulphate. Dr. Curtman proceeded by measuring into a 100 c.c. flask 10 c.c. of a normal solution of ferrous ammonium sulphate, 10 c.c. of normal sulphuric acid and 5 c.c. of the spirit to be tested, and allowed the mixture to stand a half hour, after stoppering the flask carefully with a rubber or cork stopper. The stopper was then loosened, but not taken off, and the contents of the flask heated rapidly to boiling, which was continued until all nitric oxide had been expelled from the flask, the stopper being removed toward the end. The contents of the flask were then cooled to 40° C., 10 c.c. of normal potassium iodide solution added, the solution kept at 40° C. for one hour, and the iodine titrated after cooling.

Dr. Curtman did not claim great accuracy for this method, and gave preference to Allen's gasometric method. Following the directions above given, the present writer obtained 4·03, 3·38 and 4·07 per cent., against 4·59 by nitrometer. After several unsuccessful attempts, 4·75 per cent. was obtained in duplicate estimations, by doubling the time allowed for the reaction in the first part of the process. Aside from the fact that it requires considerable care and attention, this method is subject to several sources of error that are likely to discourage its use. The nitric oxide acts as a carrier of oxygen and raises the result, though to a less extent than is the case with the first method discussed. This is evidenced by the fact that the results were always much too high when the mixtures of ferrous sulphate, sulphuric acid and spirit were allowed to stand much longer than one hour before expelling the nitric oxide. The liability of ferr*ous* salts to contain ferr*ic* salts is also apt to cause error and inconvenience.

The new method alluded to at the beginning of this paper is based on a reaction between nitrous and chloric acid, thus:

$$3HNO_2 + HClO_3 = 3HNO_3 + HCl.$$

This reaction has long been known, but seems not to have been utilized for quantitative purposes until recently. An abstract in *Ztsch. f. ang. Chem.*, 1898, p. 307, which is the only reference to this method the writer has been able to find, is translated as follows:

"*Estimation of Nitrites.*—B. Grützner (*Rev. fals.*, 1898, 21), dissolves 0·1 to 0·2 gramme of the nitrite in 500 c.c. of water, adds 0.5 gramme of potassium chlorate and a known volume of $\frac{N}{10}$ silver nitrate, strongly acidulates with nitric acid, while shaking, and titrates after a few minutes the excess of silver with $\frac{N}{10}$ sodium chloride." It would have been of interest to see the original article, to learn the reasons for some of the procedures directed, but the conclusion is reached that the method is intended primarily for alkali nitrites, as it is utterly inadequate in the above form for the estimation of ethyl and amyl nitrite.

For metallic nitrites, from which nitric oxide is set free immediately upon addition of a stronger acid, such great dilution with water, as is directed, may not be objectionable, and will prevent loss of nitric oxide when the reaction is permitted to go on in an open vessel, but a large quantity of water is not necessary for the estimation of sodium and potassium nitrites in the writer's experience, when a well-stoppered flask is used, and in the assay of ethereal nitrites such a dilution would retard the reaction to such an extent as to make the method impracticable. With a bulk of 50 c.c. for 0·2 gramme of ethyl nitrite, about thirty minutes was required for a complete reaction, and ten to fifteen minutes for a bulk of 25 c.c. Greater dilutions than these would only cause an unnecessary loss of time.

The addition of silver nitrate at the beginning, as directed by Grützner, necessitates keeping the solutions in a dark place until they are ready for titration, but as it has been found that frequent shaking is required to facilitate the reaction, exclusion from light is rather inconvenient. For this reason parallel experiments were made

to determine if it would be justifiable to omit the silver nitrate until the reaction between nitrite and chlorate was ended. In two estimations the silver nitrate was added at the beginning, and the mixture excluded from light as much as possible; in two others no silver nitrate was added and the solutions placed into the light. All of them were otherwise treated in the same manner, as nearly as possible, and titrated after standing the same length of time. The results were 4·55 and 4·52 per cent. for the first pair and 4·65 per cent. for each of the second. It is seen that the figures are somewhat higher when the silver is not added until reaction is complete, which has been confirmed by subsequent estimations, but it is probable that they are more nearly exact.

It was also thought expedient to substitute potassium or ammonium sulphocyanate for sodium chloride in residual titration, so as to permit the use of a color-indicator, which much facilitates the work.

In the following experiments, made to determine the time required for an estimation, 25 c.c. of water, 5 c.c. of a saturated solution of potassium chlorate, 5 c.c. of spirit of nitrous ether, and 5 c.c. of 10 per cent. nitric acid were successively placed into a 100 c.c. flask, which was at once securely stoppered, and allowed to stand a definite length of time, with occasional shaking, and then titrated. The spirit used assayed 4·28 per cent. by nitrometer.

Time allowed for reaction.	Per Cent.
5 minutes	3·75; —
10 "	3·85; —
15 "	3·91; 4·11
30 "	4·29; 4·34
60 "	4·55; 4·60
Over night	4·65; 4·65

Under the above conditions, then, at least an hour is required to obtain results approaching the maximum per cent. obtainable. The highest figures also show a decided increase over the per cent. obtained by nitrometer. An increase had been expected, as the gasometric method has always been supposed to yield somewhat low results, but not such a great one. A similar difference was found in all samples of spirit of nitrous ether examined and a still greater one in amyl nitrite, but, as will be shown later, the results by the new method are entitled to more credence.

In further attempts to shorten the method, it was found that

further limitation of the bulk of the solution and persistent shaking materially hasten the reaction. With 10 c.c. of water, instead of 25 c.c., and frequent shaking, 4·58 and 4·6 per cent. was obtained after fifteen minutes. Without any addition of water 4·55 and 4·58 per cent. was obtained in the same length of time. In the latter case the solution became yellow, showing secondary reactions, and this degree of concentration is therefore not advisable, although the figures obtained are normal. Frequent shaking is required to bring into contact with the solution the vapors of ethereal nitrite diffused through the air above the liquid, which would otherwise remain unchanged for a considerable time.

The high results of this method, as compared with Allen's gasometric method, led to the suspicion that they might be due to the presence of aldehyde, but a few experiments showed that this was not the case. The same spirit as had been used in the experiments given above was assayed with the addition of 0·1 c.c. and 0·2 c.c. of 99 per cent. paraldehyde, respectively, to 5 c.c. of the sample, a great deal more of aldehyde than could possibly be present in any sample tested. The results were practically the same as without aldehyde, namely, 4·60 and 4·54 per cent. This was repeated with 0·5 c.c. and 1·0 c.c. of the aldehyde for 5 c.c. of spirit and the mixtures allowed to stand over night before tritrating. The results were 4·3 and 4·12 per cent. The presence of aldehyde, therefore, affects the accuracy only when a very large quantity of it is present and in such a case does not increase, but *decreases* the result. No interference need be feared from the amount of aldehyde naturally present.

To obtain further data about the reliability of the method, an attempt was made with pure silver nitrite. If the reaction proceeded according to theory, exactly one-third of the silver in the salt would be converted into chloride, and the remainder stay in solution in form of nitrate, according to the following equation:

$$3AgNO_2 + KClO_3 = AgCl + 2AgNO_3 + KNO_3.$$

A very rapid blackening of the precipitate, as soon as exposed to light, however, the cause of which is not known, made the estimation impracticable. The silver nitrite used had a good appearance, and gave 70 2 and 69·95 per cent. of silver, 70·1 per cent. being required by theory.

A specimen of sodium nitrite, sold as meeting the U.S.P. requirements (not less than 97·3 per cent. pure) was assayed by the new method, which gave 98·8 and 98·5 per cent., and also by the gasometric method, which gave 100·3 and 100·9 per cent., correction being made for temperature only. The figures obtained by the latter method are evidently too high, and the error is perhaps mainly caused by the failure to make correction for pressure and vapor tension, which might easily have reduced them to 98 per cent. The results of the new method are, without doubt, nearer the actual percentage. This still leaves unexplained the fact that the old method invariably gives considerably lower results than the new in the estimation of ethereal nitrites. The surmise that it might be partially due to an increase in solubility of nitric oxide in the nitrometer liquid, through presence of alcohol, was disposed of by parallel estimations of sodium nitrite with and without alcohol. The last estimations recorded were repeated immediately, under the same conditions of atmospheric pressure, temperature, etc., but with addition of 5 c.c. of alcohol to the aqueous solution of sodium nitrite in the nitrometer before adding the reagents. Instead of being lower, the results were a little higher, 101·3 and 101·0 per cent.

An old, deteriorated specimen of potassium nitrite, which gave 78·3 and 78·6 per cent. by the new method, assayed 80·1 and 79·6 per cent. by nitrometer, corroborating the results obtained on the sodium nitrite.

There was still a possibility that some of the by-products that usually accompany ethyl nitrite in addition to aldehyde, such as ethyl formate, acetate, oxalate and ethyl ether—and the corresponding ones in the case of amyl nitrite—might be accountable for the high figures given by the new method. The fact that the differences in the results of the two methods are in fairly uniform ratio, for products from different sources and doubtless varying methods of preparation, however, makes this very improbable. To settle this point, the following experiment was made: To an aqueous solution of about 8 grammes of the same sodium nitrite as had been used in previous experiments, 0·5 gramme each of sodium formate and sodium oxalate, and 0·5 c.c. each of ether, ethyl acetate, and paraldehyde were added, and the solution assayed in the same manner as had been done without addition by the new method. This gave 95·2 and 94·5 per cent., instead of 98·5 and 98·8 per cent., which

was the result given by the nitrite alone, indicating that the impurities usually contained in ethyl nitrite do not raise, but rather tend to lower the results of the method. All evidence so far adduced, then, tends toward the same direction, *i. e.*, that the method is not liable either to give too high or too low results under ordinary conditions, and that under abnormal conditions the tendency is toward low rather than high results. The natural inference, therefore, is that the results of Allen's gasometric method are always too low in the estimation of ethereal nitrites.

The following details have been adopted as being considered the most practical:

Valuation of Spirit of Nitrous Ether.—Into a 100 c.c. flask or bottle of white glass, provided with a loosely-fitting stopper of glass, rubber or cork, place successively 10 c.c. of distilled water, 5 c.c. of a cold, aqueous, saturated solution of potassium chlorate, 5 c.c. of the spirit to be tested, and 5 c.c. of 10 per cent. nitric acid. Quickly insert the stopper and shake frequently during thirty minutes. Then add 10 c.c. of $\frac{N}{10}$ silver nitrate, shake briskly for a moment, add 10 drops of ferric ammonium sulphate solution, and titrate the excess of silver with $\frac{N}{10}$ potassium sulphocyanate. (The titration should be performed without delay, to avoid darkening of the precipitated silver chloride by the influence of light, which interferes with the end-reaction.) The end-point is reached when, after *momentary* shaking, upon addition of the last drop of solution, the appearing red color is not entirely dispersed, but leaves the liquid faintly reddish throughout. The color will frequently disappear after *persistent* shaking or after standing a while, but no attention need be paid to this. Assuming the spirit to contain 4 per cent. by weight of ethyl nitrite, and to have a specific gravity of 0·84, it would require 2·55 c.c. $\frac{N}{10}$ potassium sulphocyanate to precipitate the excess of silver in solution. As each cubic centimeter of $\frac{N}{10}$ silver nitrate consumed in precipitating the chloride formed corresponds to 0·0225 gramme of ethyl nitrite, the calculation is as follows:

$$\frac{(10 - 2{\cdot}55) \times 0{\cdot}0225 \times 100}{5 \times 0{\cdot}84} = 4{\cdot}0 \text{ per cent.}$$

If the specific gravity of the sample is assumed to be 0·84, which is approximately correct in most cases, the calculation can be shortened by simply multiplying the number of cubic centimeters of $\frac{N}{10}$ silver nitrate required by 0·536. In this case it is $7{\cdot}45 \times 0{\cdot}536 = 4{\cdot}0$ per cent. This factor can be employed only when 5 c.c. of spirit are taken for assay. If it is desired to avoid calculation entirely, 2·7 c.c. of spirit and half the quantities of the reagents may be taken, in which case each cubic centimeter of $\frac{N}{10}$ silver nitrate indicates 1 per cent. of ethyl nitrite.

Concentrated nitrous ether may be assayed by diluting with alcohol in definite proportions, or in accordance with the directions on the label, and proceeding as in the assay of spirit of nitrous ether.

Valuation of Amyl Nitrite.—Partially fill a 100 c.c. graduated flask with alcohol, insert the stopper and weigh. Add five to six grammes of the amyl nitrite to be tested and weigh again. Fill the flask to the 100 c.c. mark with alcohol and mix thoroughly by shaking. Then proceed in the same manner as directed for spirit of nitrous ether, using 20 c.c. of distilled water, 10 c.c. of the saturated solution of potassium chlorate, 10 c.c. of the alcoholic dilution of amyl nitrate and 10 c.c. of dilute nitric acid. Also use 20 c.c. of $\frac{N}{10}$ silver nitrate and titrate the excess as directed above, observing the same precautions. The calculation of results is made as explained by the following example: Assuming the alcoholic dilution to contain 6·037 grammes of the sample in 100 c.c., the 10 c.c. taken for assay contain 0·6037 gramme. If in titrating the excess of silver, 5·45 c.c. of $\frac{N}{10}$ potassium sulphocyanate are required, $(20 - 5{\cdot}45 =)$ 14·55 c.c. of $\frac{N}{10}$ silver nitrate, each cubic centimeter equivalent to 0·0351 gramme of amyl nitrite, have been consumed in precipitating the chloride formed in the reaction. The calculation then is

$$\frac{14{\cdot}55 \times 0{\cdot}0351 \times 100}{0{\cdot}6037} = 84{\cdot}6 \text{ per cent.}$$

In the application of this method care must be taken either to use pure reagents or to make allowance for the interfering impurities

they may contain, which is easily done. Potassium chlorate and nitric acid, in their commercial forms, nearly always contain chloride, but they can readily be obtained free from it. Ammonium ferric sulphate may also contain chloride in traces. Nitric acid may contain lower oxides of nitrogen, indicated by a yellow color of the acid and brown vapors in the air-space of the container. The correction is most readily made by mixing these reagents in the same quantities as used in the assay and allowing the mixture to stand a while. If, on the addition of a few drops of $\frac{N}{10}$ silver nitrate, only a slight opalescence appears, no correction is necessary; if the solution becomes decidedly turbid or a precipitate is formed, a known volume of silver nitrate should be added and the excess determined with sulphocyanate. The silver nitrate required to precipitate the chloride is deducted from that required in the actual assay.

Commercial Samples.—The samples reported upon below were purchased in original packages in the open market and fairly represent the American market. They were assayed by both the U.S.P. and the new chlorate method, and also subjected to the other pharmacopœial tests. The acidity is given in terms of nitrous acid for the sake of convenience, although it is not known that the free acid consists entirely of this. For the same reason no deduction is made from the percentage of ethereal nitrite, for the free nitrous acid included in the estimations as ethyl or amyl nitrite.

SPIRIT OF NITROUS ETHER.

No.	P. C. Strength by U.S.P. Method.	P. C. Strength by Chlorate Method.	Per Cent. of Free Acid.	Aldehyde.
1	3·66; 3·70	4·06; 4·01	0·14	Faintly yellow
2	4·84; 4·88	5·30; 5·30	0·11	" "
3	4·28; 4·31	4·58; 4·60	0·45	Dark "
4	3·95; 4·00	4·38; 4·44	0·15	Straw "
5	4·35; 4·32	4·81; 4·84	0·31	Dark "
6*	85·5; 85·9	92·6; 92·0	0·46	Straw " (Tested after dilution to 4 per cent.)

* Concentrated nitrous ether, stated to be 90 per cent. ethyl nitrite.

The acid determinations were made with $\frac{N}{1}$ soda, with phenolphthalein as indicator and without dilution with water. When water

was added to the spirit before titrating, or when the undiluted spirit was titrated with $\frac{N}{10}$ instead of $\frac{N}{1}$ soda, considerably higher figures were obtained, doubtless through saponification of the esters. The U.S.P. test for limit of acid in spirit of nitrous ether is the addition of a crystal of potassium bicarbonate, which must cause no effervescence. No acid could be detected in any of the samples by this test. After dilution with an equal volume of water and addition of the bicarbonate, No. 2 caused bubbles of gas to rise from the surface of the crystal slowly; No. 3, under the same conditions, more rapidly. It would not be safe, however, to depend on the test thus performed, owing to the rapid decomposition of ethyl nitrite in presence of water. Titration with $\frac{N}{1}$ alkali seems to be the most satisfactory.

The remarks in the aldehyde column refer to the color of the spirit after prolonged contact with alkali, under the conditions prescribed by the Pharmacopœia, which requires that the color should not be decidedly brown within twelve hours after admixture. The requirements are therefore fully met by all samples.

AMYL NITRITE.

No.	P. C. Strength by U.S.P. Method.	P. C. Strength by Chlorate Method.	Per Cent. of Free Acid.	Aldehyde.
1	77·2; 77·0	87·0; 87·4	0·6	Dark straw color
2	76·0; 76·4	86·7; 86·2	0·67	Brownish yellow
3	17·3; 18·8	21·0; 18·9	0·76	Deep yellow
4	82·7; 83·5	93·9; 93·4	1·36	Dark straw color
5	79·0; 78·4	85·9; 85·3	1·12	Deep yellow

Excepting No. 3, the samples are fairly well in accord with the pharmacopœial requirements. This sample was somewhat lighter in color than the others, and had a peculiar musty odor, probably derived from the stopper, which was old and defective, and had been badly attacked by the contents of the bottle.

Nos. 4 and 5 exceed the limit of acid set by the Pharmacopœia, which is 1·08 per cent., interpreted in terms of nitrous acid. It was found most convenient to determine the acidity by titrating an alcoholic dilution of the ether with $\frac{N}{1}$ soda, using phenolphthalein as indicator.

In testing for aldehyde, the Pharmacopœia requires that on shaking equal volumes of amyl nitrite and $\frac{N}{1}$ potassium hydrate, the aqueous layer shall not be more than pale yellow. As the table shows, none of the samples is fully up to the standard in this regard.

The writer wishes to acknowledge valuable advice and aid received from Dr. Charles Rice and Prof. Virgil Coblentz in connection with the subject of this paper.

PHARMACEUTICAL LABORATORY OF THE NEW YORK
COLLEGE OF PHARMACY, May, 1898.

ORIGIN AND DETECTION OF MUCILAGE IN PLANTS.

BY HENRY KRAEMER.

By the term "mucilage in plants" is meant those substances which are soluble, or at least swell very perceptibly in water, and which, upon the addition of alcohol, are precipitated in a more or less amorphous or granular mass. Mucilage originates in the plant either as a part of the contents of the cell or as a part of the wall thereof. When it occurs as a part of the cell contents (as cell-sap), mucilage is produced either as an "Ausscheidung" from the protoplasm, or it may possibly arise in some cases as a disorganization product of some of the contents. When it occurs as a "membrane mucilage," it owes its origin to several causes, viz.: either as a form of secondary thickening or addition product to the wall; or as a metamorphosis of the cell wall, at least in part. In the latter case it may arise either as a disorganization product of the primary wall as an intercellular substance; or of the subsequent lamellæ making up the pith, medullary ray, parenchyma and other cells. In addition to these two well-authenticated cases of the origin of mucilage, viz., as a cell contents and cell-membrane, we have mucilage given out by some secreting hairs (glands). In such instances we can simply say that the mucilage appears between lamellæ of cutin on the one hand and of cellulose on the other hand, of the epidermal cells of the secreting hair.[1]

For convenience of reference, the following table, containing some

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[1] De Bary, *Vergleichende Anatomie*, S. 98.

of the important official plants yielding a mucilage, together with the origin of the same, is given:

I. *Cell-Contents Mucilage.*

1. Corm of *Orchis* sp. (Salep).
2. Rhizome of *Agropyrum repens*, L., Beauvois (Triticum).
3. Bulb of *Urginea maritima*, L., Baker (Squill).
4. Bulb of *Allium* sp. (onion, garlic).
5. Stem, leaf and elements of flower, excepting stamens, of *Viola tricolor*, L.
6. Flower-stalks of *Hagenia abyssinica*, Bruce, Gmelin (Cusso).
7. Pulp of fruit of *Musa paradisiaca* (Banana).
8. Succulent plants, as Aloe, etc.

II. *Cell-Membrane Mucilage.*

A. *Secondary thickening of wall.*

1. Root of *Althæa officinalis*, L., (Althæa).
2. Bark of *Cinnamomum* sp. (Cinnamon).
3. Bark of *Rhamnus Frangula*, L. (Buckthorn).
4. Bark of root of *Sassafras variifolium*, Salisbury, o. *Kuntze* (Sassafras).
5. Inner bark of *Ulmus fulva*, Mx. (Elm).
6. Leaves of *Barosma betulina*, Thunberg, Bart. et Wend, and *B. crenulata*, L., Hooker (Buchu).
7. Seed-coat of *Cydonia vulgaris*, L., (Quince).
8. Seed-coat of *Linum usitatissimum*, L. (Flaxseed).
9. Seed-coat of *Sinapis alba*, L., Hook. fil et Thompson, and *S. nigra*, L., Koch (White and Black Mustard).

B. *Metamorphosis of Cell-wall.*

α. Pith and Medullary Ray Cells.

1. *Astragalus* sp., yielding Tragacanth. [1]

β. *Parenchyma cells of wood and bark.*[2]

1. Cherry-gum, yielded by some of the Amygdalaceæ.

γ. *Various cells of the bark.*

1. *Acacia Senegal*, Wild., yielding Gum Arabic.[3]

δ. *Primary wall as intercellular substance.*

1. Thallus of *Chondrus crispus*, Stackhouse, and *Gigartina mamillosa*, J. Agardh (Irish moss).

III. *Secreting Hairs* (*Drüzenzotten*).

1. Leaf and calyx of *Viola tricolor*, L.
2. Leaf of *Coffea arabica*, L. (Coffee).
3. Leaf of *Prunus avium*.[4]

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[1] Mohl, *Bot. Zeit.*, 1857, S. 33.

[2] Tschirch, *Angewandte Pflanzenanatomie*, S. 210.

[3] Wigand, Pringsheim's Jahr., III, 115. Mœller, Wiener Akad., 1875, 219. Tschirch, *loc. cit.*, 213.

[4] J. Reinke, *Bot. Zeit.*, 1874, 47 and 59.

The origin of mucilage as an "Ausscheidung" from the protoplasm has been pointed out in the corms of various species of Orchis, by Frank,[1] Meyer[2] and Hartwich.[3] All have contributed more or less confirmatory researches toward this end. Frank says that in the young cells of the tuber of Orchis, near the nucleus occurs a bundle of needle-like crystals, around which a clear mucilage drop is formed. This becomes larger and larger, and finally when fully grown replaces the protoplasm and nucleus, and occupies the lumen of the cell. Arthur Meyer, on the other hand, claims that the protoplasm in Orchis species does not disappear, but that it is to be found in the older stages of the cell, and that the peripherical layer of protoplasm secretes the mucilage which lodges in between the "plasmanetz" (*i.e.*, in the vacuoles). Hartwich confirms the labors of Meyer in that he finds the peripherical layer of protoplasm in the latter stages of the life of the cell, but he does not observe the "plasmanetz." He also says, in cells of *Orchis latifolia* and *O. Morio* that do not contain raphides, the mucilage does not arise in the middle of the cell.

It is not unlikely but that in all of the plants mentioned as having a "cell-contents mucilage," and which contain rhapides of calcium oxalate as scilla (*Fig. 6*), that the origin is similar to that of Salep, viz., as an "Ausscheidung" from the protoplasm[4].

In *Viola tricolor*, L.,[5] is found, as has been previously shown by the author, peculiar sub-epidermal mucilage cells, which occur in all the leaf-like elements of the plant with exception of the stamens. These are easily ascertained by placing fresh specimens of the leaf in an alcoholic solution of methylene blue of the following strength:

ALCOHOLIC METHYLENE BLUE SOLUTION.

Methylene blue	0·400 grammes.
Alcohol (95 per cent.)	100· c.c.

The specimen is left in this solution for at least several hours, after which surface or transverse sections may be made and are transferred to a slide having a few drops of the following mixture:

[1] *Pringsheim's Jahr. f. wiss. Bot.*, V, p. 161.
[2] *Arch. d. Pharm.*, 1886, p. 325.
[3] *Arch. d. Pharm.*, 1890, p. 563.
[4] See also Tschirch, *loc. cit.*, S. 109, 125.
[5] Inaugural Dissertation, Marburg, 1897.

GLYCERIN METHYLENE BLUE SOLUTION.

Methylene blue	0·400	grammes.
Alcohol (95 per cent.)	20·	c.c.
Glycerin (nearly anhydrous)	80·	c.c.

The cover-glass is put upon the section, and in a short time the mucilage cells are stained blue (as *Figs. 1, 2, 3*) and are readily distinguished from the remaining unstained cells. Preparations so prepared may be kept indefinitely. In fact in a few weeks the contrast is even more marked than on the first day.

The nature of the contents of the sub-epidermal mucilage cells may be best studied by sectioning alcoholic material and mounting in alcohol. If to a preparation of this kind an alcoholic solution of iodine is added, the protoplasm nucleus and plastids become light brown in solor. If to a transverse section in alcohol (as *Fig. 4*) is added chlorzinciodide, the mucilage gradually swells, and the sub-epidermal cell becomesabout twice the size as when seen in alcohol. The wall between the two cells becomes blue, but the mucilage is not altered in color.[1] Surface sections of the leaf, treated with an alcoholic iodine solution, and then with an alcoholic sulphuric acid solution (containing two volumes of alcohol to one volume of concentrated H_2SO_4), allow for a closer study of the nature of the contents. (*Fig. 5*) The nucleus is central and is surrounded by a small amount of cytoplasm. From here to the peripherical layer of the protoplasm extend numerous threads of the same substance. In the periphery are a number of small plastids, being fewer and smaller than in the epidermal cells.

The fresh pulp of banana fruit treated with an alcoholic methylene blue solution, and from which sections are made and examined in a glycerin methylene blue solution, indicate that along the phloem portion of each of the fibro-vascular bundles we have a chain of cells (four to six times larger than the starch-containing parenchyma cells) which contain a mucilage. They take on a deep blue color (*Fig. 7*) and occur only associated with the fibro-vascular bundles. Their position and arrangement lead to the opinion that they are in the nature of membered mucilage tubes similar to the tannin tubes of the oaks.

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[1] For behavior of mucilages toward iodine compounds and other reagents, see Arthur Meyer, Wissenschaftliche Drogenkunde, S. 47 and Tschirch, *loc. cit.*, S. 206.

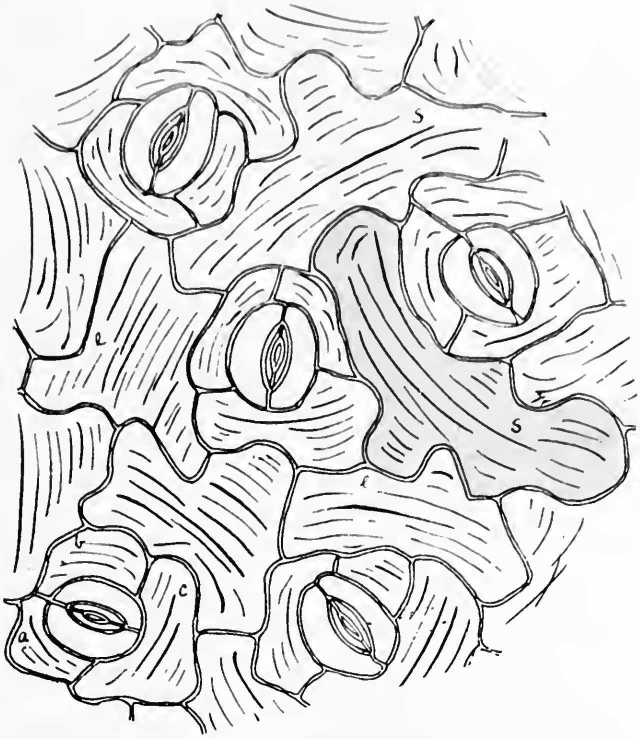


FIG. 1.

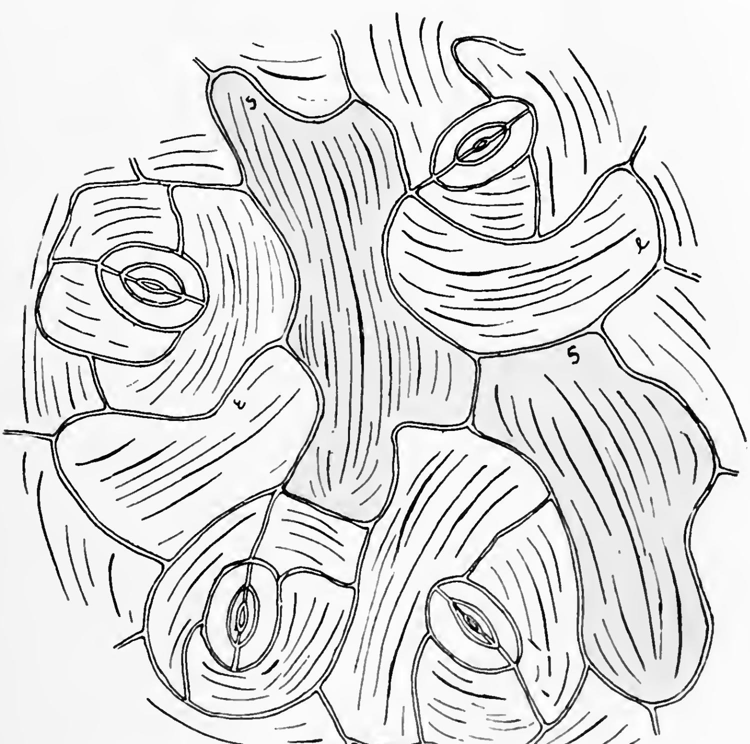
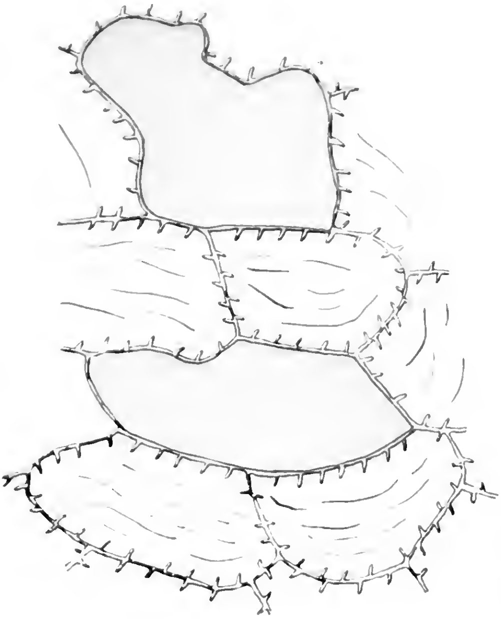


FIG. 2.



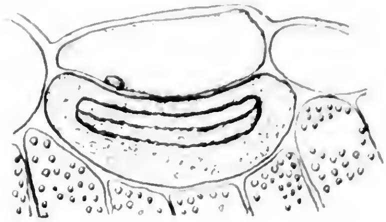


FIG. 4.

FIG. 3.

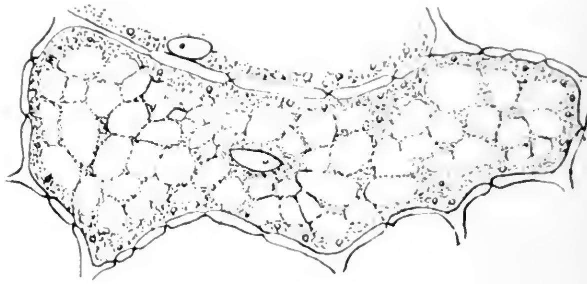


FIG. 5.

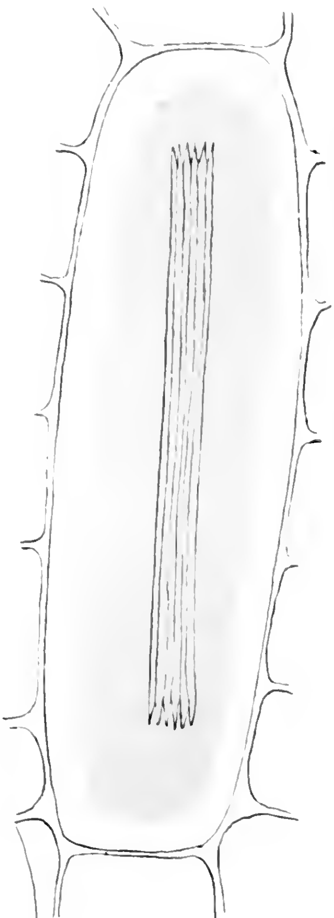


FIG. 6.

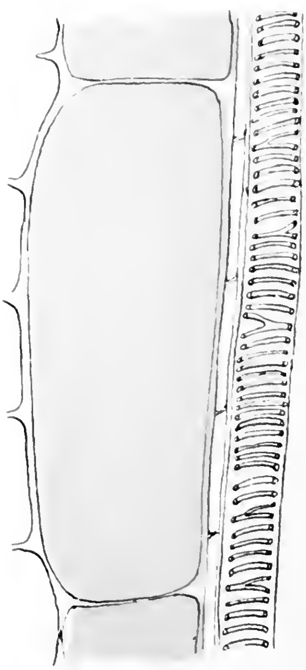


FIG. 7.

The origin of "cell-wall mucilage" may be best studied in the young roots and stems of althæa.[1] In the very young elements the mucilage cells are found to be much larger than in the surrounding parenchyma. If in this stage sections of fresh material are treated with alcohol, there is no indication of any of the cells containing mucilage. A little later, however, we find in older specimens that, in addition to the protoplasm and nucleus, there is a granular layer formed on the inside of the wall. Upon the addition of water this layer swells, and upon subjecting it to the methylene blue treatment it is found to be a mucilage layer. The cell wall grows in thickness by the successive depositions of lamallæ of mucilage, and finally in old cells we observe only a small lumen with a little protoplasm, the mucilage wall occupying the remainder.

The study of these mucilage cells may be performed on commercial specimens of althæa root. If the latter are first washed in water until softened, and then put into strong alcohol, we have material that may be easily sectioned. Sections are made and are put into an alcoholic methylene blue solution for several hours or longer. These are then mounted on a slide in a glycerin methylene blue solution. In the course of a few hours the mucilage cells have taken on a prominent blue color and are distinct from the other parenchyma cells (*Fig. 8*). The lamellæ are pronounced, and in the centre a small, irregular lumen with a small amount of protoplasm is observed.

If a specimen of elm bark of commerce is treated similarly to that of althæa root, equally, if not more, characteristic are the blue colored mucilage cells (*Fig. 9*).

Mucilage occurs as a secondary thickening beneath the cuticle of a number of seeds, as Sinapis alba (*Fig. 10*) and Linum (*Fig. 11*), etc. If sections of the dry seeds are mounted first in a solution of glycerin and water and then a glycerin solution of methylene blue added, the mucilage layer becomes a permanent blue color, stronger in Sinapis alba than in Linum.

The secretion hairs (or glands, as they are sometimes called) which we find at the apex of the divisions of the leaves of *Viola tricolor*, L., and other plants, yield a mucilage. In the leaves of *Viola tricolor*, L., at the apex of the divisions of the lamina and stipulæ, we find large

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[1] See Tschirch, Anatomischer Atlas, Lief. VI, S. 128.

secretion hairs. These may possess a head-like portion alone, or may have in addition a stalk. They arise very early, especially upon the stipulæ. They serve some function in the developing lamina and then disappear. Later are formed similar hairs upon the crenate margins of the lamina. When not fully mature, the epidermal cells of the secretion hairs possess a relatively large amount of protoplasm, a large nucleus and a few rather large vacuoles (*Fig. 12*). When fully matured the secretion hair usually resembles that shown in *Fig. 13*. The upper portion or head is rounded and consists of two kinds of cells, those upon the periphery being larger and of irregular shape, those below these being smaller and nearly isodiametric. The cells of the stalk resemble closely those of the remaining portion of the leaf. The epidermis of the upper portion or head is thicker than that of the stalk and consists of lamellæ of cutin and cellulose between which, however, later arises the mucilage. If a hair that is about to discharge its mucilage is removed from the leaf and mounted in a few drops of picronigrosin or basic lead acetate solution, or glycerin methylene blue solution and slight pressure brought to bear upon the cover-glass, the cutin layer is ruptured, the mucilage is discharged, becoming faint blue with picronigrosin or methylene blue solution, or granular and almost colorless with basic lead acetate solution.

The use of methylene blue as a reagent for mucilage in plants, as outlined by the author, has the advantage that it is decisive, as only some lignified cell-walls otherwise take up this color, and it may be applied by proper manipulation to dry as well as fresh plant material.

DESCRIPTION OF ILLUSTRATIONS.

(1) Surface section of the epidermis of the under surface of the leaf of *Viola tricolor*, L.

(2) Surface section of the epidermis of the upper surface of the leaf *Viola tricolor*, L.

(3) Surface section from the under surface of the spurred petal of *Viola tricolor*, L., *var. vulgaris*, Koch.

(4) Transverse section of leaf of *Viola tricolor*, L., showing epidermal cell and sub-epidermal mucilage cell.

(5) Surface section of sub-epidermal mucilage cell of *Viola tricolor*, L., treated with alcoholic iodine and sulphuric acid solution.

(6) Longitudinal section through a commercial specimen of a fleshy scale of bulb of scilla, showing mucilage layer around acicular crystals of calcium oxalate.

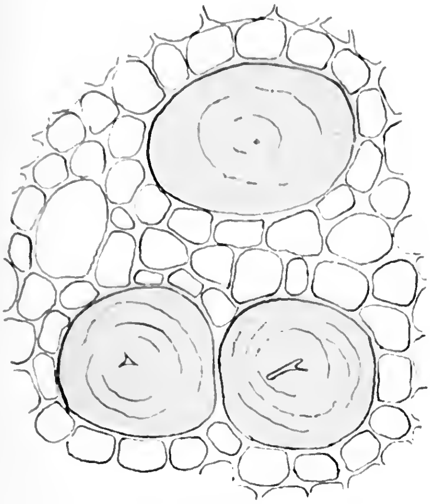

FIG. 8.

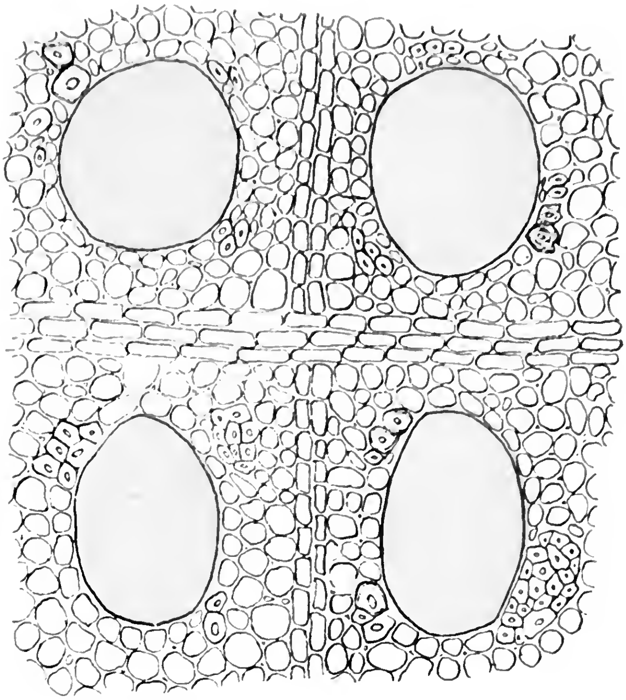

FIG. 9.

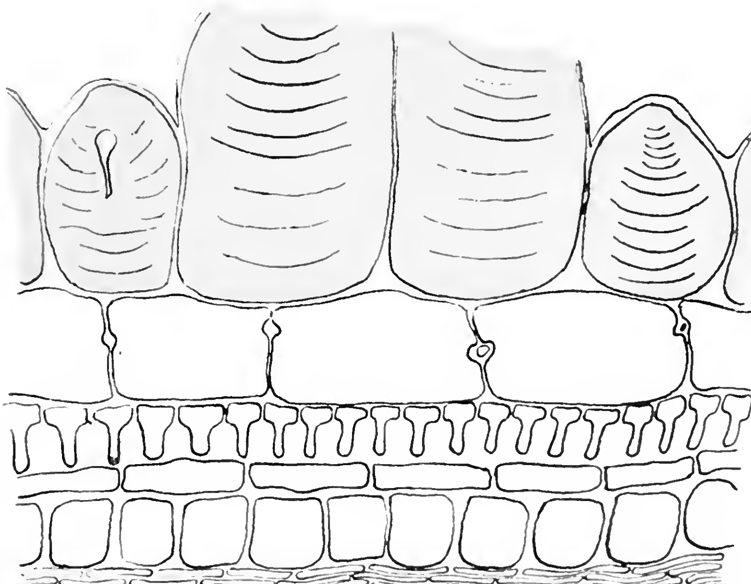

FIG. 10.

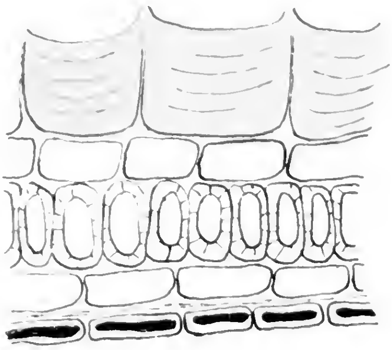

FIG. 11.

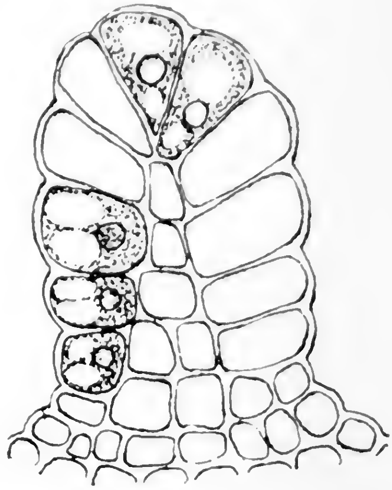

FIG. 12.

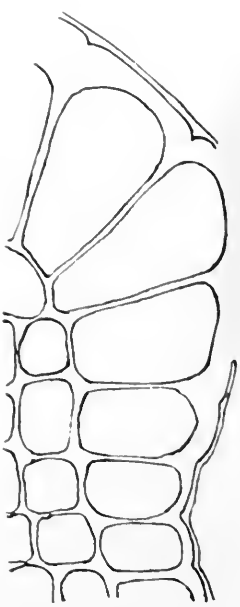

FIG. 13.

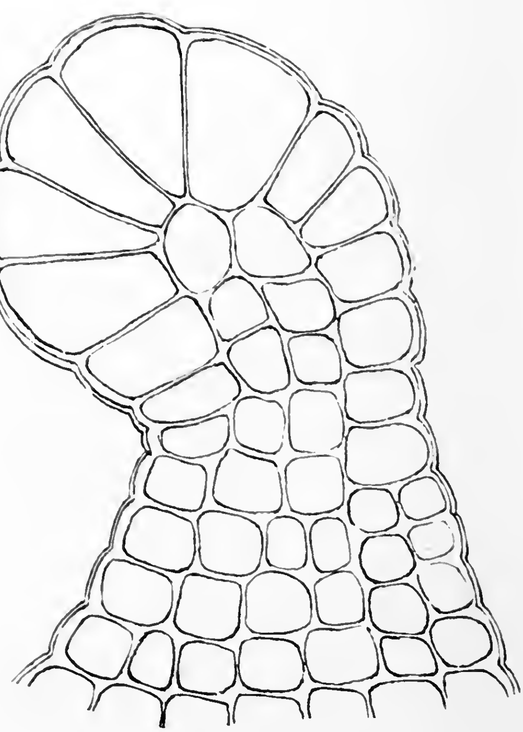

FIG. 14.

(7) Longitudinal section through the pulp of banana fruit near a fibro-vascular bundle, showing large membered mucilage secretion cell.

(8) Transverse section through a commercial specimen of Althæa root treated as described in the test, showing large mucilage cells with lamellæ and irregular protoplasmic contents.

(9) Transverse section through a commercial specimen of Ulmus treated similarly to the Althæa specimen. The large mucilage cells are surrounded by parenchyma cells containing starch and calcium oxalate crystals and a few bast fibres.

(10) Transverse section of seed coat of Sinapis alba, showing outer mucilaginous wall.

(11) Transverse section of seed coat of linum showing outer mucilaginous wall.

(12) Nearly mature secretion hair on leaf of *Viola tricolor*, L. The cells upon the periphery contain a large nucleus, protoplasm and a few relatively large vacuoles.

(13) Fully matured secretion hair on leaf of *Viola tricolor*, L., with stalk.

(14) Mature secretion hair of *Viola tricolor*, L., that was ready to discharge its mucilage. Upon mounting in a glycerin methylene blue solution or in picronigrosin and pressing upon the cover-glass with a needle or pencil, the mucilage is discharged and takes up the stain.

HYDROGEN PEROXIDE AS A FACTOR IN SPONTANEOUS COMBUSTION.

By Charles H. LaWall.

The danger of explosion of hydrogen peroxide, when kept in tightly stoppered bottles, has long been recognized as a serious drawback to the purchase of any considerable quantity at one time. The deterioration or decomposition which, in the most favorable instances, takes place to some extent after several weeks' standing in the bottled condition, is accompanied by liberation of oxygen, which (if the bottle be very tightly stoppered) accumulates until the pressure is great enough to force out the stopper or burst the bottle, the latter circumstance occasionally being attended by considerable damage to objects in the immediate vicinity.

Although a working process was included for the preparation of hydrogen peroxide in the 1890 Pharmacopœia, at the time of its admission, few pharmacists attempt to make it themselves, and its manufacture is confined to a limited number of firms who make it on a very large scale.

As transportation is very detrimental to it, and, considering the large amount of it that is handled yearly, the small number of ex-

plosions reported is to be wondered at. Probably this may be largely accounted for by the fact that it is usually the custom of the manufacturer to replace bottles broken spontaneously, and it has necessarily made him very cautious regarding the condition of the bottles and the acidity and volume strength of the preparation when it leaves his hands.

Quite recently, however, the writer's attention was attracted to a new property of this article, which property, it is believed, has never before been recorded.

It was the phenomenon of spontaneous combustion, caused by hydrogen peroxide under certain conditions. The property was investigated further, and experiments verified the conclusion that, under certain favorable conditions, hydrogen peroxide is capable of causing spontaneous combustion.

The circumstances attending it were as follows: About April 24th the writer and his assistant went botanizing in New Jersey. Neither Rhus toxicodendron nor Rhus venenata were yet in leaf nor flower, although many of the plants were observed and avoided on general principles.

The next day the assistant discovered that his right wrist was affected by Rhus poisoning, and a course of treatment was begun, using peroxide of hydrogen, which seemed to act very favorably upon the eruption. A cheesecloth bandage was wrapped about the wrist and kept saturated with peroxide by pouring on a small quantity occasionally. The treatment was discontinued in the evening, and the bandage removed before retiring. On the second day of the treatment a rush of work interfered with the previous practice of keeping the bandage constantly moistened, and, after several applications during the earlier part of the morning, the matter was entirely forgotten. Several hours later an odor of burning clothes and severe pain in the wrist directed the patient's attention to the fact that the bandage was smouldering and was already charred black in many places. Before it could be removed, it had caused several burns on the wrist, which required weeks to heal and which will show scars for several years.

The experiment was afterward repeated by saturating the same material (cheesecloth) with peroxide of hydrogen and exposing it to the heat of a drying oven, meanwhile observing the temperature and action of the peroxide. Charring took place in all cases, but in no

case was it produced at blood heat, the lowest temperature at which the action was observed being 65° C.

The conditions produced by wrapping a bandage in the manner described may lower the temperature of combustion somewhat, but as no one cared to submit himself to experiment in that direction, so the occurrence is given as it was noted, without verification.

The probable cause of the phenomenon is the presence of a slight amount of free sulphuric acid, which is allowed by the U.S.P. for the purpose of preserving the solution. When the experiment was tried with hydrogen peroxide which had previously been neutralized, little or no charring effect was produced on the material used, while a 1 per cent. solution of sulphuric acid produced charring to a greater extent than the peroxide in the first instance.

305 CHERRY STREET, PHILADELPHIA.

BELLADONNA PLASTERS.

By CARL E. SMITH.

In the April number of this journal the writer published a paper on this subject, in which was included a report on the examination of a number of commercial plasters. The most of these were far lower in alkaloidal strength than was to be expected from any reasonable interpretation of the pharmacopœial requirements, if it be assumed that the manufacturer would follow the spirit of the Pharmacopœia by upholding the strength there indicated indirectly, even if it was found impracticable to follow it in the letter, in the substitution of extract of Scopolia root, rubber, resins, etc., for the officinal ingredients. As the officinal plaster is intended to be equal in strength to its own weight of belladonna *leaf*, and the average alkaloidal strength of this is 0·3 or 0·4 per cent., a plaster containing at least 0·3 per cent. might be insisted upon. Since the publication of the paper referred to, the writer has had occasion to assay two additional samples of commercial plasters, and found them to approach more closely to this standard than the greater part of those previously examined. They contained, respectively, 0·29 and 0·31 per cent. of alkaloids. They cannot be classed as officinal, however, since they are not made in accordance with the directions of the Pharmacopœia, but contain extract of the root (belladonna or scopolia) and rubber.

Dr. E. H. Squibb has been kind enough to call the writer's attention to some statements in the paper, that appear as if it was inferred that the officinal plaster could be made from the root as well as from the leaf, and that the alkaloidal strengths of the first three samples of the table (p. 188), from 0·4 to 0·6 per cent., were regarded as representing the standard of the U. S. Pharmacopœia. There was no intention to convey such an impression, for a strictly officinal plaster can be made only from the leaf and with a vehicle differing considerably from the rubber compositions employed by all manufacturers. The writer made use of the expression, "U.S.P. standard of strength," which is rather vague in this case, as no standard is set except that of a definite quantity of belladonna leaf containing a variable per cent. of alkaloids. In using this expression the writer left out of consideration the source of the alkaloids, meaning simply a plaster having an alkaloidal strength equal to the average alkaloidal strength of good belladonna leaf, but not necessarily made from leaf. But, since experience has shown the average to be between 0·3 and 0·4 per cent., a plaster offered as officinal, or as a substitute for the officinal, should not contain less than 0·3 per cent. of alkaloids, which is also the opinion of Dr. Charles Rice.

It is desired to correct a misstatement as to the authorship of the method of assay which has been employed in this work. Through a misconception it was credited to Mr. S. W. Williams, Ph.C., and Mr. C. E. Parker, Ph.C., as joint authors, whereas it was devised independently by Mr. Parker, but published in 1890 by Mr. Williams, and since that time modified and improved by Mr. Parker. The writer herewith apologizes to Mr. Parker for the error.

New York College of Pharmacy, May 13, 1898.

ATROPINE PERIODIDES AND IODOMERCURATES.[1]

BY H. M. GORDIN AND A. B. PRESCOTT.[2]

I. ATROPINE ENNEAIODIDE.

It has been known for a long time that in solutions of atropine salts, as in those of the salts of most other alkaloids, a solution of iodine in potassium iodide gives an insoluble precipitate. The nature of this precipitate has so far as we know not been thoroughly

[1] *The Journal of the American Chemical Society*, May, 1898.

[2] In the work of Research Committee D, Section II, Committee on Revision of the Pharmacopœia of the United States.

investigated. Jörgensen[3] has obtained and described two periodides of atropine; a tri-iodide and a pentaiodide. Our experience has taught us that in aqueous solutions the capacity of atropine for combining with iodine varies very widely, and the quantities taken up seem to depend upon the concentration of the liquids and even the order of mixing them.

The highest number of iodine atoms which a molecule of atropine can combine with seems to be nine; between this and the above-mentioned tri-iodide lie the other compounds of atropine with iodine which are formed in aqueous solution. The same is true when chloroform is used as a solvent. We reserve for a later date a report upon the exact conditions which are necessary for the formation of any particular periodide of atropine. For the present we wish to say that under the conditions described below we were able to obtain the enneaiodide of atropine, $C_{17}H_{23}NO_3\,HI.I_8$, as the sole combination of all the alkaloid, and sufficiently stable.

These conditions are the following: The concentration of the aqueous solution of the atropine salt should not exceed five-tenths per cent.; that of the iodine solution must not exceed one per cent.; the latter has to be acidulated with some sulphuric or hydrochloric acid; the atropine solution must be added to the iodine solution and not *vice versa*, and this addition must take place in small portions at a time, shaking the mixture thoroughly after each addition. At first the liquid becomes very turbid and particles of iodine are seen to be floating upon its surface; on continued addition of the atropine solution and shaking, the iodine-colored turbidity disappears, a dark granular precipitate falls out, and the supernatant liquid becomes perfectly transparent, but is still dark-colored. If the addition of the atropine be stopped at this stage, *i. e.*, while the supernatant liquid has a very dark red color, the composition of the precipitate will be found to be that of the enneaiodide $C_{17}H_{23}NO_3HI.I_8$.

Whether additional quantities of atropine will make the precipitate take up more atropine and become a lower periodide we shall try to determine by later experiments. On the other hand, when the order is reversed and the iodine solution is added to the atropine solution, it is always a lower periodide that is formed; but whether on continued addition of the iodine the precipitate will take up more of it and become a higher periodide, we cannot say as yet.

[1] *J. prakt. Chem.*, 2, 3, 329.

The enneaiodide, obtained as described, being unstable while moist and when removed from its mother-liquor, the precipitate has to be collected quickly by means of a pump, washed a few times with cold water and dried first on porous plates and then in vacuum over sulphuric acid. As thus obtained it is a very dark brown almost black powder, quite permanent in dry air and has only a slight odor of iodine. It is very difficultly soluble in ether, chloroform, benzene or carbon disulphide, but is soluble in alcohol, very freely when hot. In cold water it is insoluble; hot water decomposes it quickly; it is also decomposed by concentrated solutions of potassium iodide. At 90° C. it commences to give up iodine vapors and at 140° C. melts to a dark liquid.

To obtain it in crystalline form it is first washed with a little cold alcohol to remove traces of free iodine and then dissolved in warm alcohol. On cooling it crystallizes out in dark-green prisms and leaflets, having the same properties as the non-crystallized body.

In this enneaiodide one-ninth of the total iodine is firmly combined just as in normal hydriodides, while eight-ninths is easily removed by reducing agents, such as sulphur dioxide and sodium thiosulphate. The compound therefore may be considered an atropine hydriodide octaiodide.

The additive iodine we estimated volumetrically and the total iodine both gravimetrically and volumetrically.

To estimate the additive iodine a small quantity of the enneaiodide is dissolved in very little alcohol, an excess of a standardized solution of sodium thiosulphate added and the excess titrated back with a standard solution of iodine, using starch as the indicator.

For total iodine the substance is covered with an excess of powdered metallic zinc and some water and then boiled gently for ten or fifteen minutes, taking care to prevent loss by spurting; the mixture is then thrown upon a filter, and the containing flask and the filter thoroughly washed with hot water. The iodine in the zinc iodide thus formed can either be estimated by precipitation with silver nitrate and nitric acid and weighing as silver iodide, or it is precipitated with an excess of a standardized solution of silver nitrate and the excess titrated back with a standard solution of ammonium thiocyanate, using ferric nitrate as indicator.

Having obtained the enneaiodide of atropine it was natural to suppose the existence of a heptaiodide, with probability of a com-

plete series from the tri-iodide to the enneaiodide. And in fact in the course of our work we once obtained this heptaiodide. But our efforts to determine the exact conditions necessary for the formation of this body have so far not been successful.

The easiest way to obtain the periodides of atropine is to use chloroform as a solvent. On adding twenty grammes atropine to a warm solution of thirty grammes iodine in chloroform (500 c.c.) the enneaiodide crystallizes out very soon in the shape of small, shining, dark-green crystals. If these be removed by filtration, the mother-liquor will give several successive crops of the dark-blue pentaiodide and at last a crop of the brownish-red tri-iodide.

II. ATROPINE MERCURIC IODIDES.

The periodides of atropine, like those of many other alkaloids, easily give double salts with mercuric iodide, obtained on shaking the alcoholic solution of the periodide with mercury and gently warming the mixture. This double iodide of atropine and mercury can also be made by mixing theoretical quantities of atropine and iodine, adding a little alcohol and an excess of mercury, slightly warming, and shaking till the color of iodine disappears. If the higher periodides of atropine be used in the preparation of this double iodide of atropine and mercury, there is always separation of mercurous iodide; but, if theoretical quantities of atropine and iodide are used, there is no separation of mercurous iodide. The formula of this double iodide of mercury and atropine, as shown by our analysis, seems to be $C_{17}H_{23}NO_3.HI.HgI_2$. It resembles in composition several other double iodides of alkaloids and mercury obtained by Groves[1] by a different method. But besides this double iodide we also obtained another having the composition $(Atrop.\,HI)_2.HgI_2$. It was made by treating a solution of the $Atrop.HI.HgI_2$ in diluted alcohol with an excess of potassium iodide. From the liquor obtained by shaking an alcoholic solution of atropine and iodine with mercury the monoatropine hydriodide mercuric iodide crystallizes out in shining yellow crystals, melting at 89° to 90° C., difficultly soluble in ether or chloroform, partly soluble in hot water.

The analysis for mercury and for iodine in these bodies can be made in different ways, but the best results are obtained by a modification of the method of Risse.[2] The mercury and the iodine are

[1] *Quart. J. of Chem. Soc.*, 11, 97.

[2] *Ann. Chem.* (Liebig), 107, 223.

determined in two separate portions. For mercury the substance is dissolved in a little warm alcohol and a little water added; the solution is then acidulated with a few drops of dilute hydrochloric acid and saturated with hydrogen sulphide. The mercuric sulphide is then dried and weighed in the usual way. For the determination of iodine the substance is treated with a hot solution of potassium hydroxide (1 : 10), diluted with water, filtered, and, when completely cold, neutralized with acetic acid. The iodine is now precipitated with silver nitrate and nitric acid and determined as silver iodide in the usual way.

In the following analyses the standard silver nitrate solution was made to correspond with one per cent. of iodine and the ammonium thiocyanate solution to correspond, cubic centimeter per cubic centimeter, with the silver nitrate solution. The standard solution of iodine contained 1 per cent. of iodine, and the sodium thiosulphate solution corresponded, cubic centimeter per cubic centimeter, with the iodine solution.

Analysis of the Atropine Enneaiodide not Recrystallized: Volumetric estimation for total iodine, 0 15225 gramme required 12·2 c.c. of the silver nitrate solution.

For the iodine removed by reduction, 0·19255 gramme required 13·7 c.c. of the thiosulphate solution.

	Calculated for $C_{17}H_{23}NO_3.HI.I_8$.	Found.
Iodine by reduction	70·88	71·15
Total iodine	79·74	80·13

In the gravimetric estimation from 0·218 was obtained 0·3207 silver iodide.

	Calculated for $C_{17}H_{23}NO_3.HI.I_8$.	Found.
Total iodine	79·74	79·48

Analysis of the Atropine Enneaiodide Recrystallized from Alcohol: The methods employed were the same as with the non-crystallized compound and the standard solutions of the same strength.

In the volumetric estimation of total iodine, 0·12685 gramme required 10 1 c.c. of the silver nitrate solution. For the iodine removed by reducing agents, 0·23105 gramme required 16·4 c.c. of the thiosulphate solution.

	Calculated for $C_{17}H_{23}NO_3.HI.I_8$.	Found.
Total iodine	79·74	79·62
Iodine by reduction	70·88	70·98

In the gravimetric estimation of total iodine, 0·2031 gramme gave 0·30035 silver iodide.

	Calculated for $C_{17}H_{23}NO_3.HI.I_8$.	Found.
Total iodine	79·74	79·90

Analyses of the Double Salts of Atropine Hydriodide and Mercuric Iodide: 0·2632 gramme of the monoatropine hydriodide mercuric iodide gave 0·0699 gramme mercuric sulphide, and 0·30445 gramme of the substance gave 0·24785 gramme silver iodide.

	Calculated for Atrop. $HI.HgI_2$.	Found.
Mercury	23·03	22·89
Iodine	43·74	43·98

Of the diatropinehydriodide mercuric iodide, 0·1798 gramme gave 0·032 gramme mercuric sulphide, and 0·257 gramme of the substance gave 0·18885 gramme silver iodide.

	Calculated for (Atrop. $HI)_2.HgI_2$.	Found.
Mercury	15·58	15·34
Iodine	39·46	39·70

III. ATROPINE ESTIMATION AS PERIODIDE.

The formation of atropine enneaiodide under the conditions described above affords a convenient method for estimating the strength of atropine solutions by means of a standard solution of iodine and titrating back with a standard solution of sodium thiosulphate. The way to operate is as follows: The atropine solution, whose strength is approximately determined by a preliminary experiment, operating in the way described below, is diluted with water so as to contain at most four-tenths to five-tenths per cent. of the alkaloid, and in so doing, the solution is made up to a given volume. Twenty or thirty cubic centimeters of a decinormal iodine solution are now put into a measuring flask holding 100 c.c., diluted with a little water, and acidulated with a few drops of diluted sulphuric acid; the atropine solution is now run in from a burette slowly, and in small portions at a time, shaking the flask thoroughly after each addition and observing whether the supernatant liquid commences to clear up. If not, a little more of the atropine solution is added, and the mixture again shaken for a minute or two. In this way the addition of atropine is slowly continued till after a few shakings the supernatant liquor commences to become transparent, still hav-

ing a dark red color, which can easily be seen by stoppering the flask, reversing it and looking through its neck. The addition of atropine is then stopped, the flask shaken till the supernatant liquid is perfectly transparent, and then it is diluted to 100 c.c. Of this liquid an aliquot portion is filtered off and the excess of iodine in it determined by a decinormal solution of sodium thiosulphate. Every part by weight of iodine consumed corresponds to 0·2849 part of alkaloid or every cubic centimeter of the decinormal iodine solution consumed corresponds to 0·0036048 gramme of atropine alkaloid.

These factors are obtained on the ground that for the formation of the atropine enneaiodide only eight atoms of iodine are supplied by the free iodine used to make the decinormal iodine solution, the ninth atom coming from the potassium iodide of that solution. The success of this method depends solely upon the atropine solution being sufficiently diluted, as otherwise a resinous mass is liable to be formed instead of a granular precipitate, and added in small portions at a time to the iodine solution, care being taken to shake the mixture after each addition and to stop the operation as soon as the supernatant liquid commences to become transparent, being still red-colored. It is easy to be guided by the very dark color, as an excess of atropine makes the liquid almost colorless. With a little care the method gives very good results, as can be seen from the following analyses.

Whether this method of assay is applicable to the crude drugs containing atropine and their galenical preparations, we shall try to determine by experiments to be continued.

In conclusion, we wish to say that the method of using a solution of iodine and potassium iodide for the quantitative estimation of alkaloids has been long since proposed,[1] and recently Kippenberger[2] has given considerable prominence to this method in his toxicological and other researches. But he rests upon the assumption of the formation of the atropine iodide, and this may be the leading product under the particular conditions he prescribes; but his method as a whole, when tried in this laboratory, has not given satisfactory results. The estimation of caffein as a periodide recently published by Gomberg[3] proves highly satisfactory.

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[1] Bouchard: *Compt. rend.*, **9**, 475: R. Wagner. *Ding. poly. J.*, **161**, 40. *Ztschr. anal. Chem.*, **1**, 102.

[2] *Ztschr. anal. Chem.*, **35**, 10; **34**, 317, etc.

[3] *Jour. Amer. Chem. Soc.*, **18**, 331.

In the following estimation of the strength of atropine solutions both the iodine solution and the sodium thiosulphate solution were strictly decinormal. Of the iodine solution 20 or 25 c.c. were put into a 100 c.c. measuring flask and atropine solutions of known strength run in from a burette and the operation continued as described above. When the supernatant liquid was perfectly transparent, the flask was filled up to 100 c.c. and 50 c.c. were filtered off. In these 50 c.c. the excess of iodine was determined by means of the tenth-normal thiosulphate solution and the strength of the atropine solutions calculated by using the factor 0·0036048 for every cubic centimeter of decinormal iodine used up.

No. of sample.	Number of c.c. of the atropine solution taken.	Number of c.c. of the tenth-normal iodine used up.	Calculated strength. Per cent.	Actual strength. Per cent.
1	12	15·6	0·47	0.50
2	15	14·9	0·36	0·40
3	17	13·2	0·28	0·30
4	12	10·0	0·28	0·25

We shall try to determine experimentally whether this method is also applicable to other alkaloids and their galenical forms.

The above-mentioned factor for every cubic centimeter of the decinormal iodine solution was deduced as we said upon the ground that only eight atoms of iodine of every molecule of the atropine enneaiodide are furnished by the free iodine of the iodine solution—the ninth atom forming the normal iodine of the enneaiodide coming from the potassium iodide.

That this is really so has been admitted by almost all chemists in the case of all other periodides whose constitution is similar to that of the atropine enneaiodide. It would, therefore, seem to be superfluous to prove experimentally the correctness of this view with regard to the enneaiodide of atropine. But owing to the fact that Kippenberger in the above-cited articles advances a different view, we thought it advisable to prove irrefutably that the iodide of potassium of the iodide solution takes an active part in the reaction by which the atropine enneaiodide is formed and gives off an amount of iodine which is just equal to the amount of the normal iodine of the enneaiodide.

We proceeded in the following manner: We first determined the strength of our iodine solution with regard to free iodine; this was done by means of a sodium thiosulphate solution of known strength. We then took 10 c.c. of this iodine solution and determined the total

amount of iodine, free as well as bound to potassium, by shaking them in a flask with an excess of powdered metallic zinc till the color of iodine disappeared, filtering the solution of zinc iodide and potassium iodide thus obtained, washing the flask and the excess of zinc with hot water and precipitating the iodides in the filtrate with silver nitrate and nitric acid. From the weight of silver iodide, washed and dried in the usual way, we calculated the amount of total iodine present in our iodine solution. By subtracting the amount of free iodine from that of the total iodine, we obtained the amount of iodine present in our solution as potassium iodide. We thus found that the iodine solution contained 1 per cent. free iodine and 1·2312 per cent. combined iodine.

We then put 40 c.c. of this iodine solution in a 100 c.c. measuring flask, added 20 c.c. of a three-tenths per cent. solution of atropine alkaloid, and, after shaking well, diluted the liquid in the flask to 100 c.c. We now took two vials and in each filtered off 25 c.c. from the flask. In the first vial the amount of free iodine titrated back with sodium thiosulphate was found to be 0·0465. From this it is easy to deduce that the 20 c.c. of the three-tenths per cent. atropine solution consumed 0·214 gramme of the free iodine. In the second vial the total iodine was determined in the same way as described above and the quantity of silver iodide was found to be 0·3023 gramme, which shows that after the treatment with atropine the liquid contained 1·633 per cent. total iodine. From these data we deduce that the 20 c.c. of the atropine solution have taken up 0·02528 gramme iodine from the bound iodine. As the 20 c.c. of atropine solution contained 0·06 gramme atropine we find for 100 parts of precipitated enneaiodide

	Found. Per cent.	Calculated. Per cent.
Atropine	20·05	20·26
Iodine taken from the free iodine of the iodine solution	71·50	70·88
Iodine from the iodine bound as KI	8·45	8·86

We see that in aqueous acidulous solutions the potassium iodide takes an active part in the reaction by joining in a yield of hydriodic acid for the normal hydriodide of the alkaloid, necessary to hold the additive iodine of the periodide. When carbon disulphide or carbon tetrachloride is used as solvent for the atropine and the iodine, no periodide seems to be formed, possibly for the reason of there being

no generation of hydriodic acid for the making of hydriodide. As to the formation of the periodides in chloroformic solutions of atropine and iodine, it might possibly be explained by the substituting action of iodine either upon the chloroform or upon a side-chain of the atropine.

The direct substitution of iodine for some of the hydrogen in these bodies might, in this case, be made possible by the presence of the natural base which combines with the hydriodic acid, when formed by such a substitution. Part of the atropine would then act in a manner similar to that of mercuric oxide, which is usually employed in the iodizing of hydrocarbons. An analogous case we have in the easy substitution of iodine for some of the hydrogen in aniline, a part of which combines with the hydriodic acid, which is set free through the substitution of iodine for hydrogen in another part. At any rate we shall endeavor to determine the by-products formed when atropine enneaiodide is produced in chloroformic solutions.

UNIVERSITY OF MICHIGAN, February 28, 1898.

SODIUM PHOSPHATE SOLUTION.[1]

BY JOSEPH W. ENGLAND,
Philadelphia Hospital, Philadelphia.

The limited solubility of the official "crystallized" sodium phosphate—about 10 grains to the fluidram of water, at ordinary temperature—and the much less solubility of the "dried and powdered" salt of commerce—often used—which is the crystalline salt minus its 60·3 per cent. of water of crystallization, has militated somewhat against the more extended employment of the compound, although its use has rapidly grown in recent years. The so-called "granular" form is more convenient to handle than the crystalline, but it contains almost as large a percentage of water, and, as efflorescence of salt readily takes place on exposure to air, water is lost, and the percentage of active ingredient becomes indefinite.

The advantage in using the dried and powdered salt rests in the fact that it contains only about 1 per cent. of water, and loss of water, if any, is within very narrow limits.

Various formulas have been proposed for making solutions of

[1] Read by invitation before the Philadelphia County Medical Society, May 11, 1898.

sodium phosphate. The one most generally employed is that of a "solution of citro-phosphate of sodium," originated by William C. Wescott (AMERICAN JOURNAL OF PHARMACY, 1896, 256), as a result of his analysis of a widely-advertised proprietary preparation, claimed by the manufacturers to contain, in each fluidram, 85 grains of combined sodium phosphate, citric acid, and sodium nitrate.

Wescott's formula is as follows:

Sodium phosphate, crystals	7 ozs. (Troy) 290 grains.
Citric acid	475 grains.
Sodium nitrate	73 grains.
Water, a sufficient quantity to make . . .	8 fluidounces.

Triturate the salts and acid until they liquefy, and add the water.

Now, it will be noticed that, in this formula, the proportion of citric acid used to *anhydrous* phosphate is very large, relatively, *i.e.*, about one-third. Three thousand six hundred and fifty grains of crystalline salt would yield 1,449 grains of anhydrous salt, and for this 475 grains of citric acid is directed.

The question that naturally arises at this point is, "What chemical change ensues in the making of this preparation?" In the writer's opinion, part of the official sodium phosphate, or acid phosphate, is changed into sodium diacid phosphate, and sodium citrate according to the following reaction:

$$\underset{1071\cdot96}{3Na_2HPO_4.12H_2O} + \underset{209\cdot5}{H_3C_6H_5O_7.H_2O} =$$

$$\underset{359\cdot4}{3NaH_2PO_4} + \underset{257\cdot54}{Na_3C_6H_5O_7} + \underset{664\cdot52}{37H_2O}.$$

If this theory be correct, it will be seen that a part of the sodium phosphate is changed to sodium citrate. Assuming that the reaction given is correct, it will be found by equation that, in the 8 fluidounces of solution, 475 grains of citric acid are changed to 584 grains of sodium citrate, or about 9 grains of the latter to each fluidram.

The question that we, as pharmacists, should like to ask of you, as physicians, is this, "Whether or not the presence of sodium citrate and of sodium nitrate is ever contraindicated, therapeutically, when the use of sodium phosphate is indicated?" If they are, then a formula should be devised, whereby this objection shall be eliminated.

For more than a year past, the writer has used in the Philadel-

phia Hospital a formula which he thinks overcomes such an objection, if it exists. The following is the formula used, slightly increased in proportion of ingredients over original formula:

Sodium phosphate, dried and powdered	3 ozs. (Troy) 96 grs.
Acid, phosphoric (50 per cent.)	1½ fl.-ozs. (921 grs.)
Water, a sufficient quantity to make	8 fluidounces.

Dissolve the solids in the water, which has had the acid previously added to it, and filter through paper.

Especial care should be taken to use the nearly anhydrous "dried and powdered" sodium phosphate, and *not* the "granular" salt with its 57 per cent. of water, or the resulting preparation will be excessively, and possibly dangerously, acid. If desired, the 85 per cent. acid, of the U.S.P., '90, may be used in place of the 50 per cent., employing a proportionately less quantity (*i. e.*, 542 grains). The 85 per cent. acid should be always weighed, however, and not measured, in order to ensure greater accuracy. Its great density increases possibility of error in measuring, unless checked by weighing.

The dose of this preparation of sodium phosphate is one to two teaspoonfuls in a wineglassful or more of water, preferably hot, three times a day, one hour before eating. If taken cold it may be made very acceptable by the addition of about ten grains of sodium bicarbonate (baking soda), when effervescence of carbonic acid gas ensues, and a grateful vichy-like solution results. If the volume of the dose be objected to, a teaspoonful or more of the solution diluted with an equal volume of water may be given, followed by the wineglassful or more of water. But, on therapeutic grounds, a relatively larger volume of water should always be given coincidentally with the dose.

As thus made, the solution of sodium phosphate is a clear, transparent, faintly acid liquid, slightly heavier than official syrup, having a cooling saline taste, mixing with water unchanged in all proportions, remaining liquid at ordinary temperature, and yielding to each fluidram, on evaporation to thorough dryness, about thirty grains of anhydrous salts.

In the making of the solution, the writer believes that the following chemical re-action takes place, in part:

$$\underset{141\cdot8}{Na_2HPO_4} + \underset{97\cdot8}{H_3PO_4} = \underset{239\cdot6}{2NaH_2PO_4}$$

In other words, the official sodium acid phosphate becomes par-

tially sodium diacid phosphate—just as occurs, probably, in following Wescott's formula—while the larger proportion remains the official sodium acid phosphate, but with the difference that *no* sodium nitrate or citrate is present, or is formed.

Clinical results have shown that no difference in effectiveness results from the presence of the diacid salt with acid salt. If any objection existed to this, it could be readily met by the addition of sodium bicarbonate to each dose—as suggested above—whereby the diacid salt is alkalinized to the official acid salt.

The official sodium phosphate in solution, while chemically an acid salt—in that its molecule contains replaceable basylous hydrogen atoms—is physically alkaline in re-action. On the other hand, the diacid sodium phosphate is acid both chemically and physically, while the remaining salt of the group of orthophosphates—the normal sodium phosphate—is alkaline in re-action, and its solution, exposed to air, absorbs carbon dioxide to yield sodium carbonate and the acid phosphate.—*Philadelphia Polyclinic.*

GLEANINGS FROM THE MEDICAL JOURNALS.

By Clement B. Lowe, M.D.

SECRET REMEDIES.

The Berlin correspondent of the *Medical News* writes: "It is forbidden to sell *secret remedies* in Germany, and the Ministry of Commerce and Industry has just announced for the guidance of the courts what is meant by a secret remedy. This will remove the last loophole of the patent-medicine people, for, taking advantage of discordant legal decisions, they have been able to keep certain preparations on the market. All remedies not sold under a *prescription* from a doctor must have the formula of its contents printed on the label. This formula (and here is where the new instructions define the law) must be written, not in Latin, but, when possible, in the vernacular. It must be intelligible, not only for a doctor or pharmacist, but for any one who wishes to buy, and it must be sufficient to enable a buyer to decide whether the ingredients contained therein are such as may be reasonably expected to give relief, and whether he is paying a not unreasonable price for the amount of the different drugs which are being bought. As the merit of the

invention (if there is any) is the method of composition of the remedy, this need not be given if there is a real discovery in it, so that the inventor does not lose the benefit of his idea. This decision would strike one as a thoroughly common-sense way of dealing with a difficult question, and one calculated to eradicate the immense swindle patent medicines usually involve. Quousque tandem? How long, then, before Americans will be able to point to some such sensible law?"

There are advantages in a paternal form of government after all.

COCAINE POISONING.

The *Lancet* gives an account of a man of forty years who took ten grains of cocaine hydrochlorate by mistake, and an hour afterwards anesthesia developed. The eyeballs protruded and were immobile, the pupils semi-dilated and fixed. Expiratory dyspnea ensued, respiration sinking to 8 per minute. The pulse was strong, 120 per minute. Strychnine and digitalin caused immediate improvement, and the symptoms passed off within eight hours.

FOR CHRONIC CYSTITIS.

℞.	Guaiacol,	75 grains.
	Iodoform,	1 dram.
	Sterilized olive oil,	3 fluid ounces.

For injection into the bladder.—G. Collin, *Phila. Med. Jour.*, April 9, 1898.

FOR ULCERS OF THE LEG.

℞.	Carbolic acid,	30 grains.
	Boric acid,	2½ drams.
	Powdered camphor,	2 drams.
	Ichthyol,	5 drams.
	Oil of sweet almonds,	2½ drams.
	Zinc ointment,	3 ounces.

Apply topically.—Elden, *Phila. Med. Jour.*, April 8, 1898.

HOMEOPATHY IN BAVARIA.

At a recent meeting of the Financial Committee of the Bavarian Parliament, Herr Landmann proposed that a University Chair of Homeopathy should be established in the University of Munich. The Minister replied that the University to which the question had been referred had replied that the need of such a chair was not felt, inasmuch as homeopathy was not a science. A similar incident, which ended in a like manner, occurred not long ago in the Wurtemberg Landtag.—*Brit. Med. Jour.*

A STATE MEDICAL LAW UPHELD.

The United States Supreme Court at Washington recently affirmed the constitutionality of the act of the New York Legislature of 1895, prohibiting persons who have been convicted of, and punished for, a crime from practising medicine in the State, the opinion being delivered by Judge Brewer.—*Med. News*, April 30, 1898.

FEEDING OF INFANTS.

According to *Pediatrics*, there is a law in France forbidding the giving of solid food of any kind to infants under one year of age without the written consent of a physician. The use of feeding-bottles with long rubber tubes is also forbidden by law.

FOR GASTRO-INTESTINAL CATARRH.

In cases in which opiates are not indicated, Liebrich recommends the following mixture for the diarrhœa:

℞	Tinct. Calumbæ,	} āā	ʒ ss
	Tinct. Cascarillæ,		

M.—Sig: Twenty drops, 4 or 5 times daily.—*Med. News*, April 30, 1898.

FOR URTICARIA.

℞	Menthol,		gr. xl
	Chloroform,	} āā	℥ ii
	Aetheris,		
	Spts. Camphoræ,		

M.—Sig: For external use as a spray or lotion. The affected part should then be dusted with powdered starch or oxide of zinc.—*Med. News*, April 30, 1898.

THE AMERICAN HOSPITAL AT TEHERAN.

The hospital conducted by the Presbyterian missionaries from this country to Persia has received a gift of more than $1,000 from Persian officials and the European colony, including Russians and Turks. The American Minister, Hon. Arthur Sherburne Hardy, organized an entertainment or concert with the help of the Persian Prime Minister and a number of the diplomatic corps, by which so marked a success was achieved that the Shah requested a repetition of it at his palace. The Shah himself attended the second concert, and his distinguished guests were entertained at its close, on his behalf, and further donations to the hospital were received by several Persian magnates.—*Medical News*.

RECENT LITERATURE RELATING TO PHARMACY.

THE SACCHARINE AND ASTRINGENT EXUDATIONS OF THE "GREY GUM" EUCALYPTUS PUNCTATA.

Henry G. Smith (*Proc. Royal Soc. of N. S. Wales*, **31**, 177) has found several substances exuding from the bark of the Grey Gum. This exudation was caused by the puncture of an insect, and the character of the product depends upon the following:

(*a*) When the puncture has *not* penetrated entirely through the bark and a flow is set up, the exudation is quite white and consists largely of raffinose (melitose).

(*b*) When the puncture has just penetrated through the bark, the product is contaminated with tannic acid and eudesmin, showing that eudesmin is present in the cells of the tree with tannic acid.

(*c*) When the puncture or boring of the larva has continued into the wood of the tree, pure kino is produced, providing the sugary sap of the bark is not exuding at the same time.

This indicates that the kino is not obtained from the bark directly, but from the wood of the tree. The bark does not contain tannin, but consists principally of the sugar raffinose. The saccharine exudation was examined by Mr. Smith, and determined to be practically identical in composition with the ordinary and well-known Eucalyptus manna. It was found to consist very largely of raffinose and a small quantity of reducing sugars.

The darker saccharine exudation obtained when the puncture just penetrated through the bark contained raffinose, tannin and anhydrides, eudesmin, eucalyn and an easily fermentable reducing sugar.

The astringent exudation obtained when the puncture penetrated the wood was found to belong to the "turbid groups" of Eucalyptus kino. The crystalline substance contained in it was determined by the method previously adopted for the extraction of these new bodies, *eudesmin* and *aromadendrin*, from Eucalyptus kino (See *Proc. Royal Soc. N. S. Wales*, 1895, page 32, and AM. JOUR. PHAR., 1895, page 575). The product obtained in the present case was eudesmin. Aromadendrin could not be detected in this kino, so so that now it is possible to divide the "turbid group" of kinos into three sub-groups, based on a chemical classification, viz., (*a*) those that contain aromadendrin alone, of which E. calophylla is a representative; (*b*) those that contain eudesmin alone, of which E. punc-

tata is a type; and (*c*) those containing both eudesmin and aromadendrin, of which E. hemiphloia is characteristic. In the kino under consideration the following constituents make up the whole of the product:

Tannin and its derivatives	66·05
Eudesmin	4·45
Moisture	16·20
Ash	0·72
Debris (or residue), wood, bark, etc.	12·36
	99·78

In connection with this work, and in the same paper Mr. Smith records the separation from some of the Eucalypts belonging to the Renantheræ, of a yellow dye allied to quercetin. For this substance he suggested the name of *mystycolonin*. It was separated in considerable quantity from the leaves of E. macrorhynca. The existence of this substance in the leaves of this species was announced by J. H. Maiden, in 1887. It bids fair to become of commercial value and rival the well-known yellow dye quercitrin.

WEIGHT AND SPECIFIC GRAVITY OF WHEAT GRAINS.

A. Schischkin, on the variations in the quality of wheat grains (*Deutsch. Landw. Presse*, 1897, p. 909), has determined the specific gravity, absolute weight and nitrogen content of nineteen samples of one variety of wheat grown under systems of rotation without the application of fertilizers. The samples represented nineteen different seasons. It is shown that the absolute weight of wheat grains varies considerably in different seasons, but that the specific gravity remains comparatively constant. The nitrogen content varied from 2·205 per cent. in 1882 to 3·173 per cent. in 1891. No connection is believed to exist between the nitrogen content and the absolute weight. The samples from the smaller yields were characterized by a high nitrogen content.

Glauber Salts in the Caspian Sea.—Russian chemists have recently been investigating a salt deposit found in the Bay of Kara-Bougos, an inlet of the Caspian Sea, on the eastern shore, nearly opposite Baku. The bottom of the bay was found to be covered with a crust of crystallized Glauber salt, in many places 1 foot thick. The waters of the Caspian Sea are very salt, and in the bay named, which is nowhere 50 feet deep, evaporation goes on very rapidly. As fuel can readily be obtained from Baku, and transportation by water can be used, it is proposed to establish a factory to make sodium sulphate on a large scale.—*Engineering and Mining Journal*, March 12, 1898.

EDITORIAL.

THE BRITISH PHARMACOPŒIA, 1898.

The announcement, that copies of the new edition of the British Pharmacopœia are about ready for distribution is received with considerable interest by the pharmacists of the United States as well as those in Great Britain. Pharmacopœias reflect not only the progress of medicine and pharmacy in the country in which they are published, but show in a certain measure to all countries the present status of these professions. The English pharmaceutical journals have contained, since January 8th of this year, many references to the new Pharmacopœia, so that the general principles of this work are well known. About the middle of April advance copies were received by the British medical and pharmaceutical journals, and the latter are full of information on the nature and scope of the revision. Our knowledge of the new Pharmacopœia is necessarily from these sources.

The last edition of the British Pharmacopœia was in 1885. The work upon the new edition was begun about four years ago. Professor Attfield has acted as editor, and upon the Revision Committee have been nine physicians, eleven practical pharmacists and eight experts. This has been the first time that practical pharmacists have been invited to share in the work of the committee. We shall endeavor to mention briefly some of the striking features of the new British Pharmacopœia :

I. From a pharmaceutical standpoint, a number of innovations have been made, among which may be mentioned :

(*a*) The metric system has been introduced. All quantities used in the making of preparations are stated in terms of both Imperial and Metric systems. Imperial measures are (according to the *Chemist and Druggist*, 1898, p. 627) standardized at 62° F. and metric measures at 39·2° F. The quantities under "Characters and Tests," and in all analytical quantitative processes, are stated in the metric system only.

(*b*) The old proof spirit (Spiritus Tenuior) has been abandoned, and instead, under Spiritus Rectificatus, are given five different strengths of alcohol, viz.: 90 per cent., 70 per cent., 60 per cent., 45 per cent. and 20 per cent. Absolute alcohol is retained.

(*c*) The use of glycerin in the making of tinctures has been retained for Tinctura Kino, and extended to one other preparation, viz., Tinctura Rhei Composita, where it is added after filtering the percolate. It is added also in Extractum Sarsæ Liquidum, Tinctura Chloroformi et Morphinæ Composita and in Syrupus Pruni Virginianæ, a new preparation in the revision.

(*d*) In regard to the processes of percolation and maceration in the preparation of tinctures, it is to be noted that in both operations the marc is still submitted to pressure. In the maceration process there is no adjustment of the final bulk of preparations save in preparations like Tinctura Aloes, Tinctura Asafetidæ, etc.

(*e*) The principle of standardization of galenicals has been applied to Belladonna and Ipecac preparations in addition to those already mentioned in the 1885 Pharmacopœia, viz.: Cinchona, Jalap, Nux-Vomica, Opium and Pepsin.

(*f*) Under Liquors are added nine concentrated preparations of vegetable

drugs. These are in the nature of concentrated tinctures and infusions, the latter containing sufficient alcohol to preserve them.

(*g*) There is a marked change in the strength of some well-known preparations, in order, it is said, to establish, at least in some cases, more uniformity in doses. Tinctura Aconiti, Aqua Chloroformi and Suppositoria Morphinæ are reduced to about one-half the strength of those in the 1885 Pharmacopœia. Tinctura Nucis Vomicæ and Tinctura Podophylli are doubled in strength, and Tinctura Chloroformi et Morphinæ Composita is four times as strong as the same of the previous edition.

(*h*) Many of the articles and preparations have suffered some change in orthography, as Creosotum for Creasotum, Asafetida for Asafœtida, Aloinum, for Aloin, etc.

II. In the chemistry of the Pharmacopœia are numerous changes, notably in nomenclature. The "ide" termination of the salts of the alkaloids has been adopted, as Apomorphinæ hydrochloridum for A. hydrochloras, etc. "In defining substances," according to the *Pharmaceutical Journal and Transactions*, 1898, p. 394, "corrected data are given for many of the physical characters, and the nomenclature now used by chemists to indicate constitution has been adopted in some instances. Thus, the alkalies and analogous substances are now termed hydroxides; alcohol is named ethyl hydroxide; but the principle is not extended to ammonia or carbolic acid, which is now distinguished by the name phenol, or to water, for which the familiar name is retained without any reference to its chemical constitution. The acids are now described as hydrogen salts, and in some instances the constitution is illustrated by formulæ, the other salts of particular acid radicles being distinguished according to the metal or base they contain, as sodium acetate, calcium acetate, atropine sulphate, and so on. These innovations apply only to the vernacular names, and not to the Latin titles, of which the new names are synonyms rather than translations."

III. In regard to the botany and pharmacognosy we understand that there are marked evidences of progress, but that there are no very marked changes in nomenclature. *The Pharmaceutical Journal and Transactions*, 1898, p. 390, says: "The botanical names of plants yielding drugs in the 1898 Pharmacopœia have, with a few exceptions, been brought into accordance with the 'Index Kewensis,' and many of the illustrations referred to have been selected from more readily accessible works than hitherto. In some cases alterations of the official name have been made, for which there is no evident reason, such as Ipecacuanhæ Radix for Ipecacuanha, Cascarilla for Cascarillæ Cortex, and Linum for Lini Semina. The wording of the descriptions and of the characters and tests has, in the majority of cases, been modified, so as to more carefully limit the quality of drugs to be used. Details concerning the more important microscopical characters of drugs have been added, and in over twenty instances the limit of ash has been given, apparently with the view of assisting in the detection of the adulteration of powdered drugs." We also observe the statement by F. H. Alcock (*Ibid.*, p. 422), that "the introduction of the process of sterilization seems to be the first step towards the complete study of bacteriology."

It will be seen that the British Pharmacopœia, 1898, contains many novel features, some of which at least, if not all, are in accord with the modern

sciences and practice of medicine. Some of the changes, however, may be questioned as those in strength of well-known preparations. But there are also changes which represent the results of studies and researches that have been confirmed and with which there ought to be a unanimity of expression, as the introduction of the metric system. Some will object to the new Pharmacopœia, doubtless, because it is not permeated with sufficient material that is required in everyday practice, and may say that it does not represent the professions of to-day. It must be borne in mind that the research and practice of to-day is always a step in advance of the knowledge that is accepted. There always must be the experimental or "scouting" party in search for new truths, and these are the results that are apt to be upon every tongue, and in every office and shop, and ofttimes uppermost in the minds of those who are engaged in daily practice of the professions. But these things with their reports neither represent truth nor definite knowledge, nor anything that is certain and ought to be made pharmacopœial. This distinction can only be given these reports when this knowledge has been shaped into something definite and certain, and has been repeatedly confirmed by others.

There are some who expect the Pharmacopœia to be perfect in every respect, but they will find it like themselves, imperfect, at least, in some things. We must recognize that Pharmacopœias serve primarily as a standard, a guide, according to which every one, for whom it is intended and is competent, can make similar preparations of approximately the same strength, and so on. We expect progress in the new Pharmacopœia over preceding issues. As to whether all has been omitted, incorporated or changed in the new British Pharmacopæia that might have been, requires the careful survey of a thoughtful and practical mind from the rather lofty summit of experience.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

HANDBUCH DER ORGANISCHEN CHEMIE. VON F. BEILSTEIN. Dritte Auflage. 88 te Lief. (Band IV, Lief 12). Hamburg und Leipsig, Verlag von Leopold Voss. 1898.

In this Lieferung (pages 705 to 714 inclusive) is contained the derivates of the following acids: $C_nH_{2n-4}O^4$; $C_nH_{2n-6}O_4$ — $C_nH_{2n-20}O_4$; $C_nH_{2n-22}O^4$ — $C^nH_{2n-24}O_4$; those with 5, 8, 9 and 10 atoms of oxygen; derivatives of the acids of the Furan series; sulfonacid derivatives of phenylhydrazin; phenylhydrazino acids. Also cyan derivatives of phenylhydrazin; phenylhydrazine derivatives of aldehydes; and derivatives of ketone.

ROYAL BOTANIC GARDENS. BULLETIN OF MISCELLANEOUS INFORMATION. Trinidad. Vol. III, Part IV, No. 14. Edited by the Superintendent Royal Botanic Gardens, J. H. Hart, F.L.S. Trinidad: Printed at the Government Printing Office, Port of Spain. 1898.

This bulletin contains articles on "Minor Industries"; Fermentation; Parasitism in the Scrophularineæ; Ustilago Maydis, D. C.; Oranges (the bitter and the sweet) and variations from the seed; an Estimation of the Characters of three Varieties of Cacao; and note on the agricultural exhibition.

AN EPHEMERIS OF MATERIA MEDICA, PHARMACY, THERAPEUTICS AND

COLLATERAL INFORMATION. By E. R. Squibb, E. H. Squibb and Charles F. Squibb. Vol. V, No. 1, January, 1898. Brooklyn, N. Y. 1898.

Owing to the absence of Dr. E. R. Squibb in Europe this number contains brief comments on the Materia Medica, Pharmacy and Therapeutics of the Year ending October 1, 1897, by Dr. E. H. Squibb. This is a record of information on the prominent features of these subjects during the past year. We find a wide range of subjects treated, as the use of acetic acid as a menstruum; the outlook for camphor; the commercial history of rhubarb; the uses of formalin; the status of antitoxin, and the therapeutical value of the newer synthetic products; the application of Roentgen rays to medical use, etc.

THE BRITISH PHARMACOPŒIA, 1898. Formulæ and Processes—Alterations, Additions and Omissions. Second Edition. *Pharmaceutical Journal* Reprint. 1898.

This is a summary sufficiently full of details concerning all medicinal preparations in the British Pharmacopœia, 1898, to enable the reader to appreciate fully the extent of the alterations in and additions to existing official preparations. It will be seen, on comparing these notes with the 1885 edition, that the majority of the older formulæ, processes, doses, etc., have been modified to a greater or less extent.

The following are some of the changes that may be noted:

Aqua Chloroformi.—2·5 c.c. in 1,000 c.c.

Extractum Belladonnæ Alcoholicum.—contains 1 per cent. of the alkaloids of the root.

Extractum Opii Liquidum.—Each 100 c.c. contains 0·75 gramme of morphine.

Injectio Apomorphinæ Hypodermica.—Each 100 c.c. contains 1 gramme of apomorphine hydrochloride.

Pilula Phosphori.—Each 100 grammes contains 2 grammes of phosphorus.

Suppositoria Morphinæ.—Each suppository contains ¼ gramme of morphine hydrochloride.

Syrupus Ferri Iodidi.—1 grain of ferrous iodide in each 11 minims.

Tinctura Aconiti.—1 gramme of aconite root for 20 c.c. of tincture.

Tinctura Belladonnæ.—In each 100 c.c. there is 0·048–0·052 gramme of alkaloids of the root.

Tinctura Chloriformi et Morphinæ Composita.—In each 10 minims there is ¾ minim of chloroform, ½ minim of diluted hydrocyanic acid and $\frac{1}{11}$ grain of morphine hydrochloride.

Tinctura Cinchonæ.—Each 100 c.c. contains 1 gramme of alkaloids.

Tinctura Cinchonæ Composita.—Each 100 c.c. contains 0·5 gramme of alkaloids.

Tinctura Jalapa.—Each 100 c.c. contains 1·5 gramme of resin.

Tinctura Nucis Vomicæ.—Each 100 c.c. contains from 0·24 gramme to 0·26 gramme of strychnine.

Tinctura Podophylli.—Each 100 c.c. contains 3·65 grammes of resin.

Tinctura Quininæ.—Each 100 c.c. contains 2 grammes of quinine hydrochloride.

Tinctura Quininæ Ammoniata.—Each 100 c.c. contains 2 grammes of quinine sulphate.

Tinctura Strophanthi.—2·5 grammes of strophanthus seeds for 100 c.c.

Trochiscus Bismuthi Compositus.—Each contains in grains of bismuth oxycarbonate, 2; heavy magnesium carbonate, 2; precipitated calcium carbonate, 4.

Trochiscus Potassii Chloratis.—Each contains 3 grains of potassium chlorate.
Trochiscus Sodii Bicarbonatis.—Each contains 3 grains of sodium bicarbonate.
Unguentum Acidi Carbolici.—Each 100 grammes contains nearly 4 grammes of phenol.
Unguentum Acidi Salicylici.—Each 100 grammes contains 2 grammes of salicylic acid.
Unguentum Aconitinæ.—Each 100 grammes contains 2 grammes of aconitine.
Unguentum Atropinæ.—Each 100 grammes contains 2 grammes of atropine.
Unguentum Belladonnæ.—Each 100 grammes contains 0·6 gramme of the alkaloids of belladonna root.
Unguentum Cantharidis.—10 grammes of cantharides per 100 grammes of ointment.
Unguentum Creosoti.—Each 100 grammes contains 10 c.c. creosote.
Unguentum Gallæ cum Opio.—Each 100 grammes contains 7·5 grammes opium in very fine powder.
Unguentum Hydrargyri Compositum.—Each 100 grammes contains 40 grammes Unguentum Hydrargyri.
Unguentum Hydrargyri Nitratis Dilutum.—Each 100 grammes contains 20 grammes Unguentum Hydrargyri Nitratis.
Unguentum Hydrargyri Oxidi Rubri.—Each 100 grammes contains 10 grammes of red mercuric oxide.
Unguentum Sulphuris Iodidi.—Each 100 grammes contains 4 grammes of sulphur iodide.
Unguentum Veratrinæ.—Each 100 grammes contains 2 grammes of veratrine.

SEMI-ANNUAL REPORT OF SCHIMMEL & CO.—Leipzig and New York. April, 1898.

This report is somewhat briefer than customary, owing to the fact that fewer scientific researches have been accomplished in the examination of ethereal oils, during the last six months than usually. The Report adds, that "it would, however, be a mistaken inference to conclude that the realm of knowledge has been so far advanced as to admit a pause in the work of further research. On the contrary, many and important problems still remain to be solved, but it should be borne in mind that with the extended and deeper insight into the constitution of so highly complex organic compounds, the difficulties of further and accurate research, and of correct interpretation accumulate and sometimes necessitate a discriminating retrospect upon disjointed or unclassified scientific material." Among "novelties" mention is made of two specimens of new essential oils from Java. One being an oil from the fresh herb of *Ageratum conyzoïdes*, which seems to contain a compound of the sesquiterpene series. The other is from the fresh leaves of *Cæsalpinia Sappan*, L., the tree furnishing Sapan wood. The odor of the oil is pepper-like, and dextrogyre-phellandrene seems to be the principal constituent.

HATCH EXPERIMENT STATION OF THE MASSACHUSETTS AGRICULTURAL COLLEGE. Bulletins Nos. 52 and 53. March and April, 1898. Amherst, Mass.

These bulletins contain information on concentrated feed-stuffs; spraying for the destruction of insects and fungous growths; and variety tests for fruits.

UNITED STATES DEPARTMENT OF AGRICULTURE, DIVISION OF BOTANY. Circular No. 14, 1898, pp. 7. This is a pamphlet by Lyster H. Dewey, assistant of the Division of Botany, upon Dodder's Infesting Clover and Alfalfa.

PENNSYLVANIA PHARMACEUTICAL ASSOCIATION.

The Pennsylvania Pharmaceutical Association will hold its twenty-first annual meeting in the Buena Vista Spring Hotel, Franklin County, on the 21st, 22d and 23d of June next. The first session will commence on the afternoon of Tuesday, June 21st, upon the arrival of the trains on the Western Maryland Railroad It is expected that the Secretary will have the usual card orders for tickets, at excursion rates, to the place of meeting, which can be had upon application to him. Entertainment at the hotel will be furnished at $2 per day.

The place of meeting is in the heart of the Blue Ridge Mountains, close to the Maryland line, and near the well-known pic-nic grounds of Penmar. This locality is noted for its magnificent mountain scenery.

The Maryland Pharmaceutical Association will also hold its annual meeting at the same time in the Blue Mountain House, which is near, but it is in the State of Maryland. A programme will be arranged by which the members of the two Associations will be able to attend both meetings and participate in all evening entertainments. The meeting will certainly be a very interesting and pleasant one, and members should attend and bring their ladies with them, and become acquainted with the members of their neighboring State Association.

Harrisburg, Pa. J. A. MILLER, *Secretary.*

MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, May 17, 1898.

The last of the series of Pharmaceutical Meetings for 1897–98, was held in the Museum of the College at 3 P.M. Joseph W. England presided. The minutes of the previous meeting were allowed to stand as published.

The exhibition of a collection of fungi first occupied the attention of the meeting. The exhibit was composed for the most part of specimens collected in the neighborhood of Lancaster, Pa., by H. W. Guth, P.D., Class of '98. Quite an interesting variety of genera were represented by these specimens, among which were two species of Amanita, one of these, Amanita muscaria, being noted for yielding the poisonous principle muscarine.

Of considerable interest was a sample of an edible fungus found growing in the province of Chikuzen, in Japan, which was received from Dr. Jokichi Takamine. This fungus is probably one of the Lycoperdons, and under the name of "shoro" it can be obtained in the markets of Japan, put up in small tin cans, about the size of those used in this country for canning oysters. Another specimen, and one possessing considerable interest for pharmacists, was received from Prof. J. B. Nagelvoort. This was a sample of the fungous product known as koji, and used in Japan for brewing purposes, instead of malt.

Among the remaining specimens were samples of corn smut (ustilago) in the various stages of its development. As a rule, it is found growing on the top portions of the Indian corn, this fact being interesting, as showing the means of disseminating the species.

In addition a number of the photogravures of American Fungi issued by Mr. C. G. Lloyd, of Cincinnati, were exhibited, his mycological collection probably being the finest in existence.

On motion, a vote of thanks was extended Dr. Guth for his donation.

A communication by Charles H. LaWall on "Hydrogen Peroxide as a Factor

in Spontaneous Combustion," was read by Dr. C. B. Lowe, (see page 291). The facts presented in this paper are not only interesting from the chemical point of view, but serve another purpose in warning those engaged in surgical practice against the probable danger attending the use of this solution.

Prof. F. X. Moerk in commenting upon the paper said that in making hydrogen peroxide solution, dilute sulphuric acid is added until the barium is precipitated out. He was of the opinion that the acidity of the solution is due to phosphoric acid, but that this also might cause charring.

A "Note on Sarsaparilla" was presented by Prof. Henry Kraemer. The author stated that sarsaparilla, like cinchona, had been the theme for classical research. And, that, what Flückiger had done for cinchona, Luerrsen, to some extent, at least, had done for sarsaparilla. . He also said that at one time a large number of varieties were met with in commerce, but that, like the cinchona problem, the number had been reduced in general practice to but a few kinds, and in this country, judging from prices current, to but two kinds, namely Mexican and Honduras.

The different commercial varieties were classified according to their geographical distribution, the Mexican including the product brought from Tampico, Vera Cruz and interior portions of Mexico, and the Honduras including that brought from Guatemala, Belize and Honduras. The writer stated that by means of the microscope these two kinds are easily distinguished.

Referring to some of their microscopical characteristics, he said that the cells of the hypodermis of the Mexican variety show a peculiar thickening, which he designated as the gas-flame structure, while the cells of the hypodermis of the Honduras variety are square to slightly radially elongated in shape. Characteristic differences were also observed in the cells of the endodermis of the varieties named. Still another distinction is furnished by the tendency of the parenchyma of the Honduras sarsaparilla to become collenchymatic.

In considering the therapeutic properties of the drug, the author said that recent investigations appeared to confirm its value in this respect.

A number of interesting points were brought out in the discussion of this subject, and those taking part in it were the chairman, Dr. Lowe and Messrs. Boring and Stedem.

A short sketch of the life and work of the late Prof. Dragendorff was an interesting feature of the meeting.

In answer to a query by Mr. Boring as to the method of dispensing powders in capsules, the chairman said he believed that it is the general custom to make a mass of the powder, unless the prescriber directs using the powder in dry form.

The Chairman appointed a Committee to have charge of the Pharmaceutical Meetings for the ensuing year.

On motion, the meeting adjourned. THOS. S. WIEGAND, *Registrar.*

OBITUARY.

Henry H. Wolle, who was connected with the business management of this Journal for nearly twenty-five years previous to his resignation in 1894, died on February 24th, after a brief illness, at his home in this city. He was in the sixty-second year of his age, having been born in the neighborhood of Beth-

lehem, Pa. He was the son of Bishop Wolle, at one time senior Bishop of the Moravian Church. In his early life, Mr. Wolle was engaged in the hardware business and then in the silk trade. In 1861 he accepted a position in the United States Post-office in this city, which he retained during the remainder of his life. His efficiency in this line of work was duly recognized, and in 1876 he was appointed postmaster of the Centennial post-office. His work in connection with the JOURNAL as Business Editor was performed with devotion and care. He devised an original method of keeping the mailing-list and a system of book-keeping which were especially adapted to the requirements of the JOURNAL, and he placed the business department on a sound financial basis.

Professor Dr. George Dragendorff died at his birth-place, Rostock, Germany, on April 7th, as already announced in the May issue of the AMERICAN JOURNAL OF PHARMACY. He was born on April 20, 1836. His father was a physician and gave him all the advantages of an education that he was able. Young Dragendorff attended the public schools of Rostock and at the age of seventeen had finished his studies in the gymnasium. Being desirous of associating himself with pharmacy, he was apprenticed to the renowned Dr. Witte. After three years' experience he was acknowledged an assistant and in 1858 he passed the Staatsprüfung.

In order to become more broadly and deeply educated, especially in chemistry, he matriculated in about 1859 at the University of Heidleberg. He remained here until 1860, when he was called as assistant to Professor Dr. Schulze in the chemical laboratory at the University of Rostock. This he accepted and in the following year, 1861, upon the completion of an arbeit on "Ueber die Einwirkung des Phosphors auf einige kohlensäure und borsäure Salze" he passed his examination for the degree of Doctor of Philosophy.

We see that already Dragendorff had established his reputation as a student and investigator, and when we know the character of the man from his subsequent life, we do not wonder that he should be called in 1862 by the Pharmaceutical Society of St. Petersburg to become editor of the *Pharmaceutische Zeitschrift für Russland* and at the same time the director of the laboratories of the Society. In the latter were performed the chemical analyses for the government, and here he laid the foundation for his standard work, "Die gerichtlich-chemische Ermittelung von Giften," which has passed through four editions.

In two years his scientific labors attracted so much attention that he was offered the chair (Ordentlich Professor) of Pharmacy and the Directorship of the Pharmaceutical Institute in Dorpat, Russia. This he accepted and remained here for 30 years. He proved to be in the capacity of teacher as original as he was in everything else. He was in his teachings, as in his writings, clear and logical. Students were drawn to Dorpat to be taught by him, from all over the world. He lived to impart to his students what he knew and to make of them investigators, rather than storers of facts. That he succeeded is attested by the fact that the original publications, by his students of work carried on under his direction, in his laboratory at Dorpat, number at least 400.

His broad educational views, his scholarly training, his natural resources and his scientific achievements caused him to be elected by his colleagues of the Faculty, Prorector of the University of Dorpat, from 1883 to 1887. The sterling

character of the man and his labors were not only appreciated at home, but also abroad. In 1872 he was given an honorary degree of Doctor of Medicine by the University of Munich. In 1875 he was elected an honorary member of the Pharmaceutical Society of Great Britain, and in 1885 he was awarded the Hanbury Medal. In this country he was made an honorary member of the American Pharmaceutical Association in 1868, and of the Philadelphia College of Pharmacy, November 6, 1883, having been previously a corresponding member. It is estimated that he was an honorary or corresponding member of no less than forty different scientific bodies. Notwithstanding the large number of dissertations that emanated from his laboratory, his own scientific papers and books are estimated as being not less than 115 in number. His earlier papers appeared in the *Pharmaceutische Zeitschrift für Russland.* Many of his works

were translated into English, French, Russian and other languages. Some of the important contributions to science from the pen of Professor Dragendorff are :

1868.—" Die gerichtlich-chemische Ermittlelung von Giften," St. Petersburg. A fourth edition of which appeared in 1895 and was reviewed in the AMERICAN JOURNAL OF PHARMACY, 1895, p. 427.

1869.—" Materialen zu einer Monographié des Inulins." St. Petersburg.

1871.—" Beiträge zur gerichtlichen Chemie einzelner organischen Gifte." St. Petersburg.

1873.—" Manuel de Toxicologie. Traduit par E. Ritter." Paris. A second edition of which appeared in 1886.

1874.—" Die Chemische Werthbestimmung einiger starkwirkender Drogen."

1874.—Sur la recherche des substances amères dans les bières." Bruxelles.

1874-1879.—"Jahresbericht für Pharmacognosie, Pharmacie, Toxicologie." Göttingen. From 1876 until 1879 he was associated in this Yearbook with Marmé and Wulfsberg.

1875.—"Analyse Chemique de quelques drogues actives." Paris, 1875.

1875.—"Herbstzeitlose im Bier." (Vom deutschen Brauerbund herausgegeben). Frankfort, A. M.

1876-1887.—"Sitzungsberichte der Dorpater Naturforscher Gesellschaft."

1878.—"Chemische Beiträge zur Pomologie unter Berüchsichtigung der liévländischen Obstcultur."

1881.—Die qualitative und quantitative Analyse von Pflanzen und Pflanzentheilen." Göttingen.

1884.—"Plant Analysis: qualitative and quantitative." Translated from the German by Henry G. Greenish.

1885.—"Analysen verschiedenen Kaffeesorten aus Brasilien."

1885.—"Analyse chimique des végétaux (Encyclop. Chimique)." Paris.

1898.—"Die Heilpflanzen der verschiedenen Völker und Zeiten," Stuttgart, of which, Parts one and two have appeared and were referred to under Reviews in the May number of the AMERICAN JOURNAL OF PHARMACY.

In 1894 the University of Dorpat suffered a change in its administration. Its name was changed to the Russian Jurgjew, the German scientific spirit was abandoned, and Professor Dragendorff, among others, left the University. He then returned to the home of his youth and built, in connection with his home, a laboratory, where he continued his investigations and writings. Dragendorff belongs to the pioneers of this century, a few of whom still remain. In forensic chemistry and the methods for performing plant and toxicological analyses he has been the recognized author and guide. He belongs with Maisch, Flückiger, Hager, Trimen, Procter, all of whom have gone to their rest, and yet with whose labors the science of pharmacy was enriched and with whose influence the profession of pharmacy was elevated and honored.

The Admission of United States Students to French Schools, according to General Horace Porter, United States Ambassador to France, cannot be secured without the formal application of their diplomatic representative. Nor can any foreign student be admitted to any of the schools of France—medicine, pharmacy, dentistry, veterinary, painting, design, architecture, music, declamation, engineering, etc.—without this formality. In most cases two letters suffice; one making application, the other expressing thanks when the request is granted. Sometimes more correspondence is necessary, for the reason that those proposing to enter any of the high-grade schools have to produce certain certificates of studies, or diplômas, which the authorities accept only when they come through the embassy. No discrimination is made against Americans; on the contrary, the authorities extend all possible facilities to them. There is a large number of American students in Paris, and, as a rule, they are much liked by the teachers in French institutions.—*Consular Reports*, Vol. LVI, p. 363.

THE AMERICAN

JOURNAL OF PHARMACY

JULY, 1898.

A SPECIES OF COMMELINA.

By Gilbert Kent Preston, P.D.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 176.

The attention of Professor Trimble was called to a species of Commelina (supposed to be *C. virginica*) by Godfrey Aschmann, a florist of Philadelphia, whose observations led him to believe that it was of medicinal value. He found that, when made into an ointment and applied to a surface wound, it not only stops the bleeding, but also exhibits remarkable healing properties.

That the plant does possess hemostatic properties is very probable, as there are several plants in Mexico belonging to this same family that are of notable therapeutic value. Alfonso Herrera, in American Journal of Pharmacy, 1897, p. 290, describes these plants under the name of "Yerba del Pollo." He states that "the most distinguished physicians use the extract of Commelina as a kind of hemostatic in the treatment of metrorrhagia and hemoptysis. They employ it, too, as an active remedy against leucorrhœa, and as a general hemostatic in capillary hemorrhage." He was unable, however, to conclusively determine to what these properties were due, although he feels justified in attributing them to either the potassium chloride or a proteid principle.

During the term of 1895 and 1896, Mr. G. L. Genz, Ph.G., analyzed the plant in the chemical laboratory of the Philadelphia College of Pharmacy, but found nothing to which its virtues could, with satisfaction, be attributed. The material upon which he worked

Following this preliminary examination, a proximate analysis of the ground plant was made according to Dragendorff's scheme, with the results hereinafter stated.

Petroleum ether removed 1·56 per cent. of extractive matter consisting of 0·13 per cent. of caoutchouc, 0·48 per cent. of wax and 0·95 per cent. of fat.

Ether, U.S.P., 1890, extracted 1·24 per cent. of the weight of the ground plant; 14·54 per cent. of this extract was soluble in water.

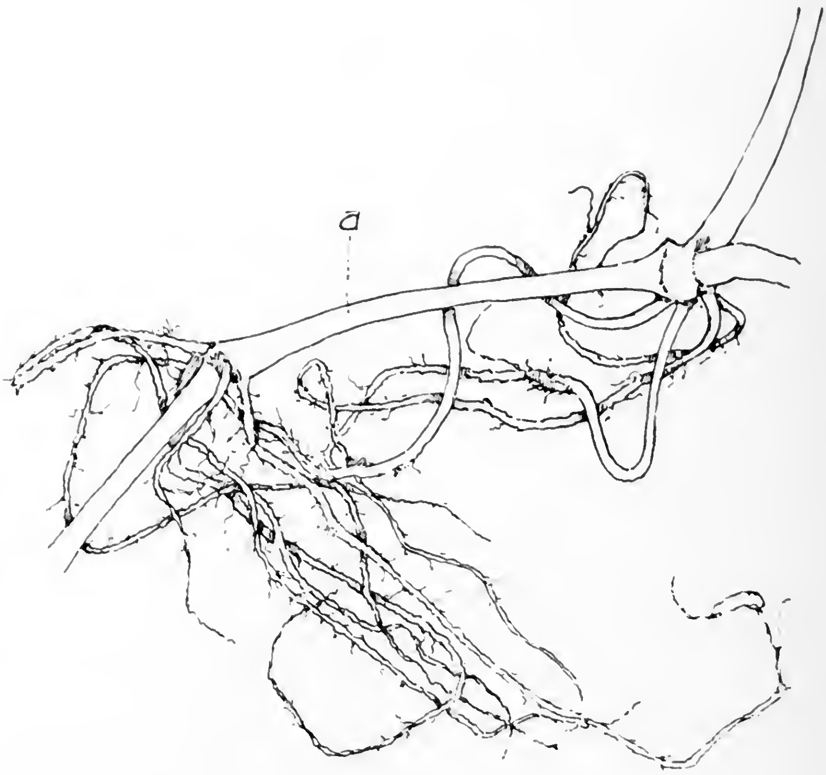

FIG. 2.

The aqueous solution had an acid reaction toward litmus paper; it reacted as follows:

Calcium hydrate produced a copious, reddish, flocculent precipitate.

Both normal and basic lead acetate gave precipitates of the same kind as caused by calcium hydrate.

Ammoniacal silver nitrate solution was reduced on the application of heat. Gold chloride solution was also reduced when heat was applied.

Fehling's solution was reduced by the plain filtrate upon warm-

ing, and after heating some of the plain filtrate with acid and again applying Fehling's solution, an increased reduction of the latter took place.

Mayer's reagent gave a very slight cloud.

Potassium tri-iodide gave still less cloud.

A portion of the solution which gave these reactions was acidified with diluted sulphuric acid, placed in a separating funnel, and

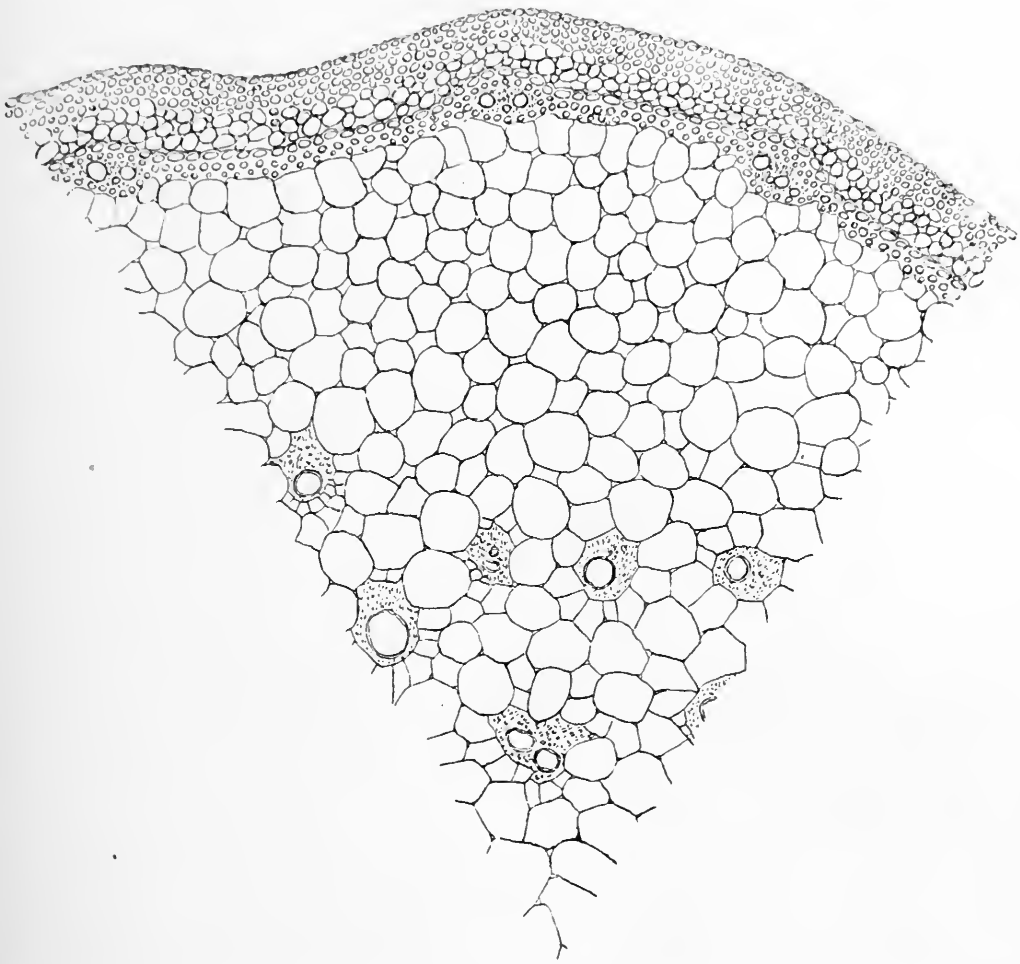

FIG. 3.

agitated with two successive portions of petroleum benzin, and afterward with two portions each of ether and chloroform. The two lots of each solvent were mixed, after being separated from the watery layer, and allowed to spontaneously evaporate. A reddish residue was left upon evaporation of the benzin. It was soluble in water; the solution possessed no reducing power on gold and silver salts, but it showed a reducing action on Fehling's solution, and,

after boiling the liquid under investigation with acid, a greater reduction of Fehling's solution occurred.

Neither ether nor chloroform removed anything from the acidified aqueous solution with which they had been agitated. The acidified aqueous solution was then rendered alkaline with ammonium hydrate, and again agitated in a separating funnel with benzin, ether and chloroform, as previously described. The benzin once more removed a small amount of reddish substance, which dissolved

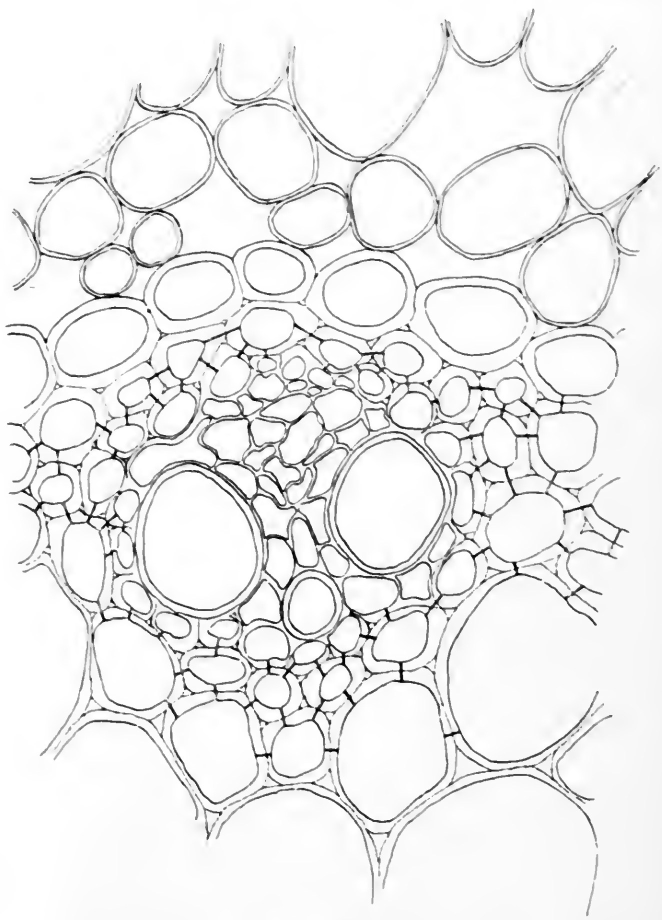

FIG. 4.

in water and reacted with Fehling's solution, as did the substance removed by benzin from the acid solution. Gold and silver salts were not reduced by this substance either. The treatment with ether removed some substance having the same character as that material taken out by benzin. Mayer's reagent and potassium tri-iodide gave no evidence of alkaloids in the substances extracted from the alkaline aqueous solution.

That part of the ether extract of the plant which was insoluble in water was treated with alcohol. This solvent dissolved 67·69 per cent. of the extract, leaving 17·77 per cent. of insoluble matter. The alcoholic solution gave the following evidence of resinous matter; the addition of water caused the precipitation of greenish resinous substance; alcoholic solution of ferric chloride gave a dark green color; alcoholic solution of lead acetate produced a green flocculent precipitate. The small amount of the ether extract, which water and alcohol failed to dissolve, was also insoluble in aqueous solution of potassium hydrate; alcoholic solution of potassium hydrate dissolved it, however, and it proved to be a mixture of chlorophyll and resinous matter.

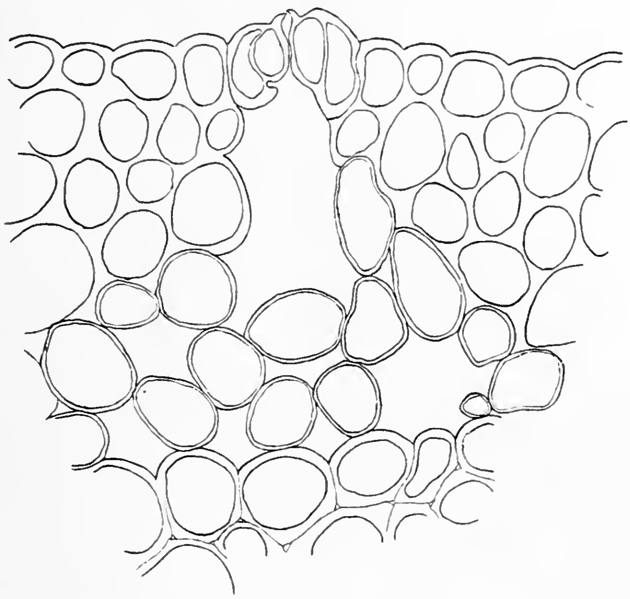

FIG. 5.

After the exhaustion with petroleum ether and ether, the plant yielded 1·04 per cent. of matter to the solvent action of absolute alcohol. Water dissolved 84·97 per cent. of the extract. The aqueous solution had a slight acid reaction toward litmus paper. It contained potassium chloride. A portion of the solution, acidified with diluted sulphuric acid, gave a copious red precipitate with Mayer's reagent; another portion, prepared in the same manner, yielded a copious reddish precipitate with potassium tri-iodide. Salts of silver and gold were reduced by still other portions of the aqueous solution of the alcoholic extract. Some of the same solu-

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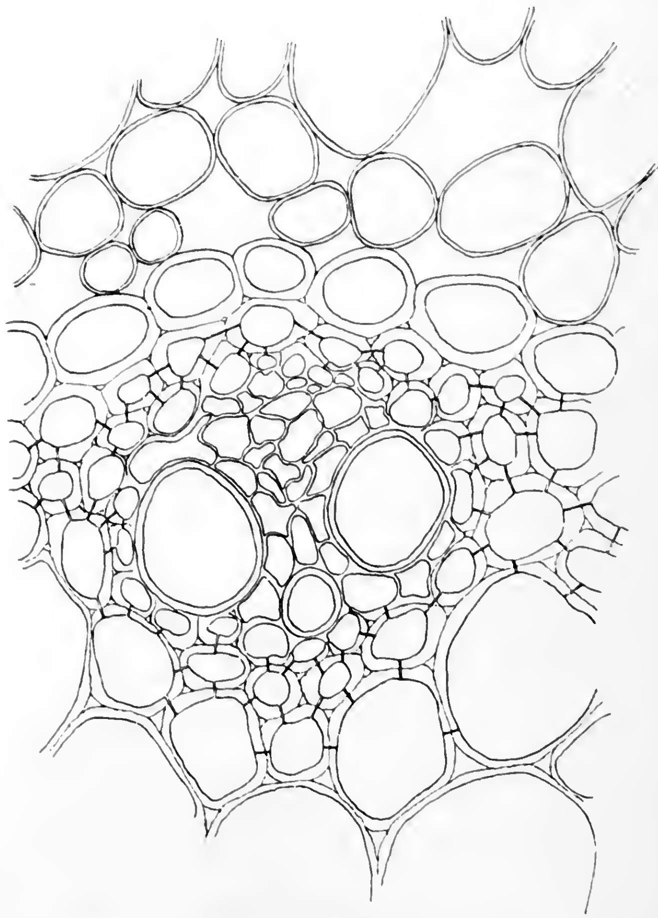

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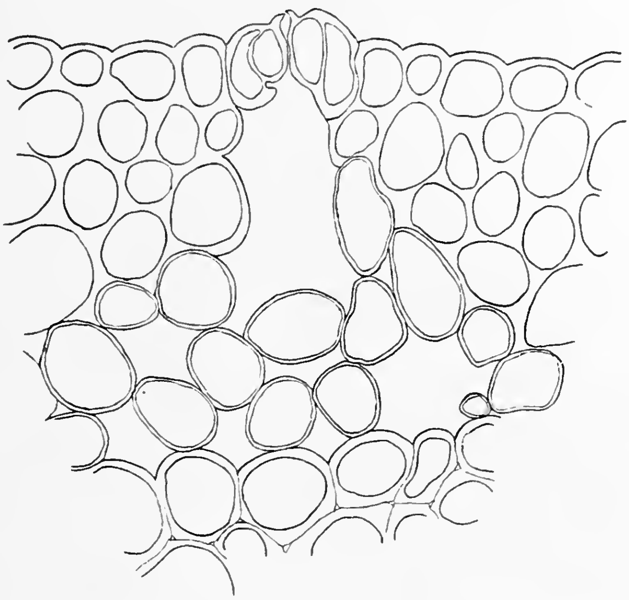

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tion was agitated with benzin, ether and chloroform in the manner described under the treatment of the ether extract. The benzin and ether removed small quantities of matter from both acidified and alkaline solution. This matter dissolved in water, and afforded neutral solutions, which were without effect on salts of gold and silver. Nor were alkaloids indicated in the solutions by Mayer's reagent or potassium tri-iodide. But Fehling's solution was reduced by the plain aqueous solutions, and, after heating portions of the solutions with acid and again applying this reagent, more cuprous oxide was precipitated. Chloroform removed only a minute quantity of matter from either the acidified or alkaline aqueous solution of the alcoholic extract. Glucose and saccharose were tested for in another portion of the aqueous solution of the alcoholic extract. The solution was first treated with lead acetate, which caused a precipitate; this was filtered off, the excess of lead removed from the filtrate by means of hydrogen sulphide, the resulting lead sulphide removed by filtration, and all traces of hydrogen sulphide expelled from the filtrate by boiling it. The liquid was then divided into two equal volumes. One of these volumes was tested quantitatively for glucose with Fehling's solution; 0·03 per cent. of this substance was indicated by the cupric oxide weighed. The other half of the solution was boiled with acid to invert any saccharose present, then made alkaline and treated with Fehling's solution, but no increase in the amount of cupric oxide was found, thereby showing the absence of saccharose. With the exception of a slight residue, that part of the absolute alcohol extract which was insoluble in water dissolved in alcohol of ·820 sp. gr. The alcoholic solution was rendered turbid by the addition of water to it; it gave a slight reddish coloration with alcoholic solution of ferric chloride, and a reddish precipitate when mixed with alcoholic solution of lead acetate.

Cold water dissolved 16·34 per cent. of organic solids from the plant, after its treatment with the solvents already mentioned. The solution of these solids had an acid reaction toward litmus paper. When the solution was mixed with five times its volume of alcohol, a precipitate was produced. It amounted to 3·40 per cent. Lassaigne's test revealed the presence of a trace of nitrogen in the precipitate, which must, therefore, have contained only a small amount of albuminous matter, and consisted almost entirely of mucilage; 0·41

per cent. of glucose was also found. Saccharose was not found. The precipitate caused by the addition of lead acetate to the solution of the water extract, in the examination for sugars, was suspended in water and decomposed with hydrogen sulphide. The lead sulphide was filtered off, and, after expelling the hydrogen sulphide by boiling, the filtrate was tested with ammoniacal silver nitrate solution and gold chloride solution, both of which were reduced.

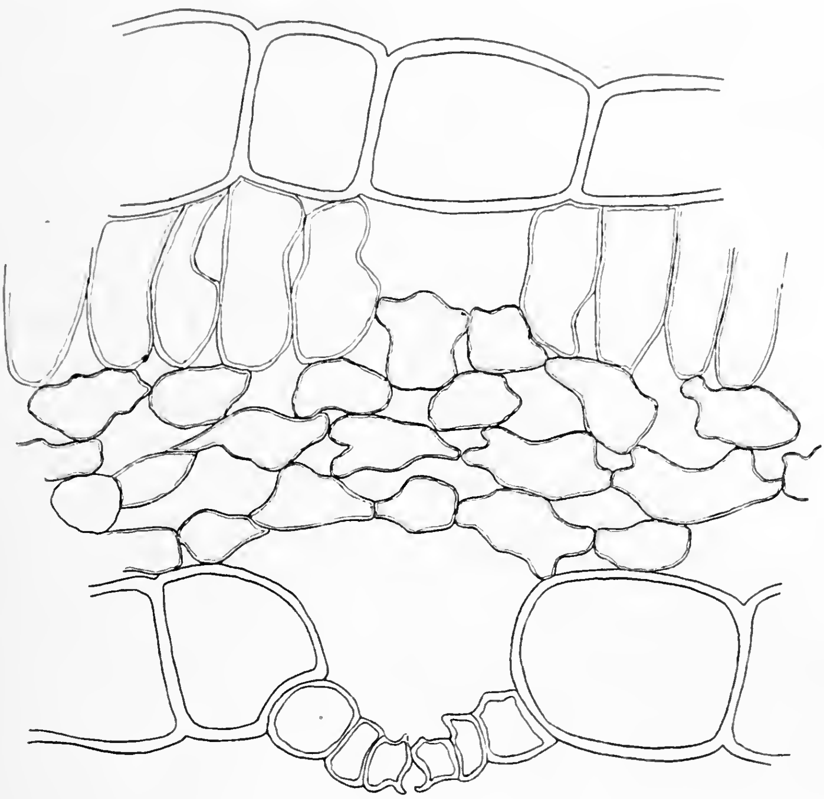

FIG. 6.

The plant was next treated with a weak solution of sodium hydrate, in water, but an accidental loss of some of the liquid extract prevented an estimation of the dissolved substances. Neither mucilage nor albuminous matter was found in this extract.

Cold water moderately acidulated with hydrochloric acid extracted 13·30 per cent. of organic solids from the plant. The dissolved organic matter was not precipitated by making the solution alkaline with ammonium hydrate, or even upon the further addition of several volumes of alcohol; 0·14 per cent. of phosphates were precipi-

tated when the acidulated water extract was rendered alkaline with ammonium hydrate.

In order to estimate the starch of the plant, the residue of the latter, from the foregoing extractions, was boiled with 5 per cent. hydrochloric acid for three hours to hydrolize the starch. The resulting glucose was treated with Fehling's solution, and the extent to which this reagent was acted on indicated the presence of 0·48 per cent. of starch.

After the conversion of the starch there remained 30.95 per cent. of cellulose, lignin and similar organic substances.

A special search was made for volatile acids. For this purpose a condenser was thoroughly cleaned by boiling distilled water in a flask into which the plant was afterward put, and conducting the vapors through the condenser until the drippings were perfectly neutral toward litmus paper. Ten grammes of fresh plant were then placed in the flask, distilled water added, and heat reapplied. The reaction of the distillate was tested with litmus, at intervals during the distillation, but no change in color was produced. The distillate was returned to the flask, and the contents of the latter acidified with diluted sulphuric acid, for the purpose of decomposing any salt of a volatile acid which might be present. The contents of the flask were then subjected to distillation, and the distillate occasionally tested during the process with litmus paper; the reaction was neutral.

The distillate was once more returned to the flask containing the plant, and the contents strained and filtered. The filtrate was made alkaline with ammonium hydrate and successively agitated with benzin, ether and chloroform in a separating funnel, but no evidence of alkaloids was obtained, from the small amounts of organic matter which these solvents removed, upon the addition of Mayer's reagent, potassium tri-iodide, picric acid, phosphotungstic acid, and gold chloride to the acidified aqueous solution of this matter. When heated with them, the substance in solution had no reducing effect on either ammoniacal silver nitrate or gold chloride solutions. The alkaline aqueous liquid with which the benzin, ether and chloroform had been agitated was supersaturated with diluted sulphuric acid. A flocculent precipitate was produced by this treatment, but it redissolved in the course of a few minutes. This solution was divided into four

portions, and tested for alkaloids with Mayer's reagent, picric acid, potassium tri-iodide and phosphotungstic acid. All of these reagents gave small, flocculent precipitates, but they may have been due to albuminous matter, and not to alkaloids. Another special search was made for alkaloids by macerating 12 grammes of fresh plant (dried) with alcohol of ·820 specific gravity for several days. The alcoholic liquid was strained off, filtered clear, and then evaporated to dryness on a water-bath. The residue was treated with water previously acidified with diluted sulphuric acid, and the insoluble matter separated by filtration. The filtrate reacted for alkaloids as follows: phosphotungstic acid gave a large, whitish precipitate; potassium tri-iodide, Mayer's reagent and gold chloride gave slight precipitates; picric acid, tannic acid, mercuric chloride and platinic chloride gave no precipitates.

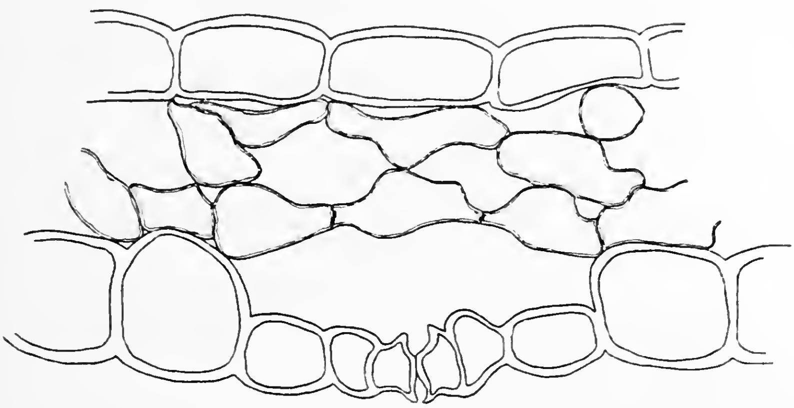

FIG. 7.

The existence of an alkaloidal substance in the plant is an unsettled matter, as the tests for it were in no case satisfactory, partly because of the very small amounts of the substances yielding the tests which could be separated.

Some of the last-mentioned filtrate which was tested for alkaloids was made alkaline with potassium hydrate and warmed with Fehling's solution, which reagent was reduced. An exactly equal volume of the same filtrate was boiled with some diluted sulphuric acid, then made alkaline and treated with Fehling's solution, as in the preceding case, when an increased amount of cuprous oxide was deposited. While this action is not taken as conclusive evidence of a glucoside, still, considering it in connection with behaviors of the same character noticed in the proximate analysis, it points to the

presence of a substance allied to the glucosides. That it is not saccharose is proved by the fact that this and similar sugars were not found in the plant, inasmuch as that the substance is removed from its aqueous solution by benzin and ether. That it is precipitated by lead acetate is shown by the fact that an aqueous solution which has been precipitated with that reagent and filtered does not develop an increased action on Fehling's solution by being boiled with acid. That it is not the substance which causes the reduction of gold and silver salts, nor the reactions with the alkaloidal reagents, is shown by the fact that the substances which affected Fehling's solution did not always influence the other reagents.

It has not been shown by the analytical data whether the sub-

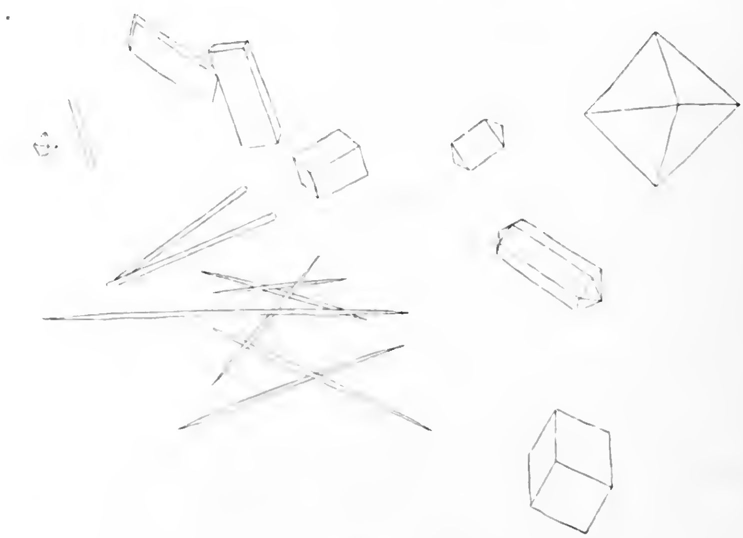

FIG. 8.

stance which reduces the gold and silver salts and that which reacts somewhat like an alkaloid are identical or distinct.

And, finally, to what the plant owes its reputed medicinal effect is still an open question.

BOTANICAL EXAMINATION.

The systematic part of the work, in the identification of the species common in the locality where the specimens under examination were obtained, requires still some investigation. Suffice it to say that the specimen was not *C. virginica*. The latter possesses slightly tuberous roots, long grass-like leaves, and seeds perfectly smooth, while the specimen examined in the chemical and micro-

scopical laboratories of the Philadelphia College of Pharmacy has lanceolate leaves from 2 to 3 inches long, roots that are not tuberous (*Fig. 2*), and deeply reticulate seeds. The specimen appears much to resemble *C. communis.* According to Thomas Morong (*Bulletin of Torrey Botanical Club*, December 1893), "*C. communis* may be distinguished from *C. nudiflora* by its open spathe, generally much broader leaves and more robust habit." He also says that the seeds are rugose and deeply pitted, instead of being reticu-

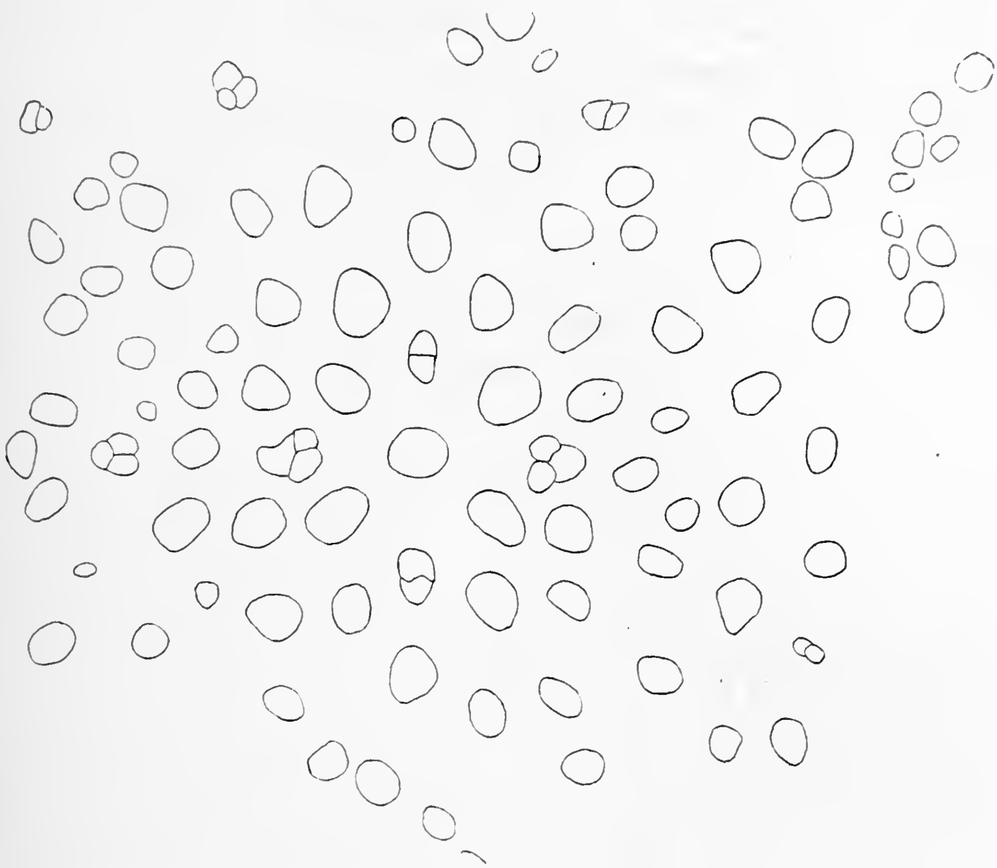

FIG. 9.

lated as in *C. nudiflora.* The specimen under examination appears to resemble *C. communis* rather closely.

The stem is procumbent or creeping in habit, and roots are being constantly produced at the nodes (*Fig. 2*). The leaves are broadly lanceolate, acute at the apex, contracted at the base into sheathing petioles. The floral leaves are large, heart-shaped, clasping bracts, enclosing a 2-4 flowered cymose inflorescence (*Fig. 1*). More time was devoted to a study of the inner morphology (anatomy) of the

the stem, leaf and bracts. The stem is more or less but irregularly cylindrical, somewhat flattened upon one side. It consists of the usual epidermis found in plants. The stomata, however, are raised. Under the epidermis occur 3-6 layers of collenchymatic cells which are but $\frac{1}{4}$ to $\frac{1}{6}$ the size of the parenchyma cells underlying these layers. A well-defined cylinder sheath, composed of rather large and strongly suberized and lignified cells, extends around the fourteen fibro-vascular bundles. Between the latter are several layers of lignified cells. The remainder of the stem towards the center consists of parenchyma, in which are seventeen fibro-vascular bundles. Many of the large parenchyma cells of the pith contain mucilage which is readily detected by the iodine or methylene blue method recommended by Professor Kraemer (AMERICAN JOURNAL OF PHARMACY, June, 1898). The remaining parenchyma cells of both pith and cortex contain crystals of calcium oxalate (*Fig. 8*) and starch (*Fig. 9*). It may be worthy of mention that a movement of protoplasm was very perceptible in some of the parenchyma cells upon making a longitudinal section of the fresh stem.

The fibro-vascular bundles are of the collateral type characteristic of monocotyledons. The ducts vary in number from two to four, and are either annular or spiral. The nature of the cells of the cylinder sheath and mucilage cells were not studied to the extent that they warrant. The character of the substance on the external and internal walls and side walls of the cells of the cylinder sheath are peculiar, and differ from each other apparently. The mucilage has much the appearance as though it were in the nature of a cell-content mucilage. In longitudinal section the mucilage cells lie very near the fibro-vascular bundles of the pith and in juxtaposition to each other in longitudinal rows.

Transverse sections of the leaf show rather large epidermal cells. The walls of these epidermal cells are very thick. The stomata appear to be confined wholly to the lower surface. The guard cells, "Nebenzellen," and another row of cells are decidedly raised above the remaining epidermal cells. The respiratory cavity is rather large. The tissue between the upper and lower epidermis consists of palisade and loose parenchyma cells. The palisade cells are rather short and somewhat loosely arranged, and are made up of a single row of cells. The loose parenchyma cells are about three rows in number and the walls are much thinner than the palisade cells.

The tissues of the bract much resemble those of the leaf, save that the palisade cells are wanting and the epidermis has a tendency to become papillæ-like. The epidermal cells are much larger in size compared to the cells of the remainder of the leaf. The loose parenchyma consists of about three rows of cells. The stomata occur only upon the lower (dorsal) portion of the epidermis, as in the leaf. The "Nebenzellen" of the stomata are likewise four.

The structure of the whole plant is interesting from a botanical standpoint. The peculiarity of the marked contrast in the thickening of all the cells of the leaf, as well as the cylinder sheath, and the presence of mucilage, lead to the conclusion that this plant possesses an arrangement for carrying on the work of transpiration that is peculiarly its own.

DESCRIPTION OF FIGURES.

FIG. 1—Upper portion of stem with leaves and inflorescence in the axils.
FIG. 2.—Portion of creeping stem producing roots at the nodes.
FIG. 3.—Transverse section of stem, for description of which see text.
FIG. 4.—One of the fibro-vascular bundles just within the cylinder sheath.
FIG. 5.—Transverse section of stem showing a stoma.
FIG. 6.—Transverse section of leaf showing a stoma upon the under surface.
FIG. 7.—Transverse section of bract with a stoma upon the lower surface.
FIG. 8.—Various forms of crystals of calcium oxalate, found principally in the stem.
FIG. 9.—Starch-grains, mostly single, sometimes compound.

THE VOLATILITY OF SOME OF THE NEWER REMEDIES.[1]

BY FRANK X. MOERK, PH.G.

Two years ago, in making some experiments relative to the paper read at the meeting of this association, the writer noticed the formation of crystalline sublimates when *Exalgin*, *Acetanilid*, *Methacetin* and *Phenacetin* were heated in an air-bath to temperatures considerably below their melting points. At different times since then a more detailed study was undertaken, but had to be discontinued owing to pressure of other work; during the past month, however, considerable experimental work has been done on this subject, and the results are presented in this paper.

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[1] Read at the Meeting of the Pennsylvania Pharmaceutical Association, June, 1898.

Before giving these results I wish to state that consultation of a large number of standard chemical publications and treatises on the "Newer Remedies" failed to reveal a single record of these substances subliming below their melting points. In a paper on "Ammonol," read by Mr. G. M. Beringer, at the Pharmaceutical Meeting of the Philadelphia College of Pharmacy, February 17, 1897, and published in the March issue of the AMERICAN JOURNAL OF PHARMACY, 1897, p. 150, is found the following paragraph: "The filtered solution of 1 gramme ammonol in 30 c.c. of water, evaporated on the water-bath, yielded a residue of 0·222 gramme, and on prolonged heating, minute micaceous crystals separated and sublimed into loose tufts on the surface. These crystals proved to be acetanilid, showing that, as stated above, it had been partly extracted by the water, and that it was more or less volatile at the temperature of the water-bath." This is the only reference bearing on the subject that I was able to find.

My knowledge, two years ago, of the volatility of the previously mentioned substances may be summed up as follows:

Exalgin and acetanilid volatilize between 40° and 50° C.; methacetin and phenacetin volatilize at 100° C.

In the second attempt to finish the experiments, about a year ago, I noticed the sublimation of exalgin between 30° and 40° C.

These experiments were made by taking sections of glass tubing, ¼ inch in diameter and about 6 inches in length, closing them at one end and introducing sufficient of the remedies to make a column 1 inch long; after removing the adhering powder above the column and putting in a small plug of cotton so as to rest lightly upon the powder, the tubes were arranged in a cork, with a thermometer occupying the central position, so that the lower end of the tubes and the thermometer bulb were in the same plane, and the powders in the tubes wholly immersed in a tin-can, which constituted an improvised air-bath. The heat was so regulated that the maximum and minimum temperatures did not differ by more than 10° C. during the experiment; thus, in heating to 30°–40° C., the object was an exposure to 35° C., although change in pressure of the gas-supply might cause variation of several degrees either way. The heat was maintained for two days and then increased 10° C.; the tubes were frequently examined during this time for the appearance of sublimates; the first proof of a sublimate was ob-

tained by examining the tubes in strong daylight or by artificial light and noting the refraction of light caused by the minute crystals. Exalgin, at 30°–40° C., showed a sublimate after twenty-four hours' heating, and at 40°–50° C. in from nine to twelve hours' heating. Acetanilid, at 30°–40° C., showed no signs of a sublimate after forty-eight hours, and at 40°–50° C. but a faint sublimate after forty-eight hours. Methacetin and phenacetin yielded no sublimate until heated for some time to 90°–100° C. Lactophenin, under the same conditions, gave no positive evidence of volatility.

Prolonged heating was necessary in these experiments, owing to the relatively small surface exposed; the recent experiments were made by heating the substances placed in watch-crystals in a water-oven, the opening in which for the escape of volatile products was closed by a cork carrying a glass tube about 6 inches long and ½ inch in diameter, through which the thermometer was introduced; this tube enabled the detection of sublimates. One-half gramme each of exalgin, acetanilid, methacetin, phenacetin and lactophenin were placed in weighed watch-crystals 2½ inches in diameter, and heated in the water-oven for the specified time; the temperatures represent respectively initial and final readings for the experiment when two are stated; after cooling in a dessicator and weighing, the weight of the watch-crystal was subtracted, giving the weight of the powder at the end of each experiment; the differenc between two successive weighings will give the loss sustained in heating for the stated period and at the stated temperatures. It will be noticed that in some cases there is an increase in weight; this is probably due to absorption of some of the more volatile substance by the less volatile; a slight difference may also be caused by allowing more or less time to elapse between the placing of the watch-crystals with contents in the dessicators and the weighing.

The results are tabulated in the order in which the experiments were made; in the last four only a single substance was heated so as to recognize the formation of sublimates; the loss of a half-milligramme gave abundant evidence as a sublimate. From the table it will be seen that exalgin, acetanilid, methacetin and phenacetin are volatile in the order given, which corresponds also to the order of their melting point; the decided difference between these four and lactophenin is no doubt chiefly due to the fact that the first four contain the acetyl group, while lactophenin contains the lactyl group.

Melting Point. / Temperature and Length of Time of Heating.	Exalgin, 100° C.	Acetanilid, 113°–114° C.	Methacetin, 127° C.	Phenacetin, 135° C.	Lacto-phenin, 116°–117° C.[1]
48°– 55° C., 3 hrs.	0·4930	0·4980	0·5000	0·4995	0·4990
55°– 46° C., 7 "	0·4825	0·4995	0·5010	0·5005	0·5005
48°– 46° C., 10 "	0·4735	0·4985	0·5010	0·5000	0·4995
62°– 68° C., 7 "	0·4235	0·4965	0.5000	0·5000	0·4995
66°– 85° C., 5 "	0·2830	0·4890	0·5000	0·5000	0·5005
80°– 85° C., 4 "	0·1890	0·4795	0·4995	0·4990	0·5000
90° C., 4 "	discontinued	0·4685	0·4980	0·4980	0·4990
85° C., 2 "	—	0·4635	0·4985	0·4985	0·4995
90°– 92° C., 3 "	—	0·4490	0·4970	0·4960	0·4985
95°– 97° C., 5 "	—	0·4315	0·4955	0·4955	0·4990
85°– 90° C., 2 "	—	0·4275	0.4955	0·4955	0·4990
98°–100° C., 4 "	—	discontinued	0·4930	0·4935	0·4985
98°–100° C., 6 "	—	—	0·4915	0·4930	0·4980
98°–100° C., 9 "	—	—	0·4885	0·4910	0·4985
98°–100° C., 5 "	—	—	0·4870	0·4895	0·4975
98°–100° C., 6 "	—	—	0·4850	—	—
98°–100° C., 5 "	—	—	discontinued	0·4880	—
98°–100° C., 7 "	—	--	—	discontinued	0·4970
98°–100° C., 6 "	—	--	—	—	0·4960

[1] No record of the melting point was found; the above determination was made without corrections.

The importance of these observations is chiefly in connection with the solubilities and quantitative estimations of these substances. The favored, because expeditious, method of ascertaining the solubility of a substance is to make a saturated solution at the proper temperature and evaporate a weighed portion of the solution to dryness on a water-bath and *complete* the drying at a temperature of

100° C. or even higher in an air-bath. The higher this temperature and the more prolonged the heating, the smaller will be the quantity of the recovered substance and, hence, a decreased solubility is the result. To illustrate: the solubility of phenacetin is stated by different authorities to be one part phenacetin in 1,400, in 1,500, in 1,850 and in 2,000 parts of water, the temperature of which ranges from cold (?) to 20° C.; these discordant statements are in all probability due to the volatility of the phenacetin.

In the quantitative estimations, drying, after treatment with suitable solvents, is a necessary operation and, hence, the same results are to be looked for. While my experiments did not include higher temperatures than 100° C., the behavior of exalgin and acetanilid will be duplicated, without doubt, at somewhat higher temperatures by the less volatile methacetin, phenacetin and lactophenin.

The difference in the behavior of acetanilid and of methacetin, phenacetin and lactophenin at temperatures below 85° C. suggested the possibility of detecting acetanilid in these other remedies. For this purpose I selected phenacetin as the substance which has the reputation of being adulterated at times with acetanilid; whereas methacetin and lactophenin, according to a criticism of my paper of two years ago, have not been known to be so adulterated, and, inferentially, my time wasted, in providing for such a contingency; 0·025 gramme acetanilid was weighed in a watch-crystal, covered with 0·475 gramme phenacetin (making a 5 per cent. adulteration) and heated in a water-oven to a temperature ranging from 80° to 85° C.; in less than one hour a distinct sublimate had formed, and after three hours' heating a loss of 0·0055 gramme was noted.

In a second experiment 0·005 gramme acetanilid and 0·495 gramme phenacetin *were mixed* (making a 1 per cent. adulteration) and heated to 72–82° C.; a distinct sublimate was seen after half an hour, and after three hours a loss of 0·0045 gramme was noted; the heating continued at 70–80° C. for six hours gave an additional loss of 0·0015 gramme. The sublimate in this case was dissolved in 2–3 c.c. warm water, and with this solution distinct reactions for acetanilid by the bromine-water and the iso-nitrile test were obtained; the solution failed to respond to the tests for phenacetin, indicating its absence in the sublimate, or, if present, in a very much changed ratio from the mixture used in the test.

This sublimate test will, no doubt, be applicable to methacetin

and lactophenin as well as to phenacetin, and has the great advantage over all other tests proposed for such adulterations, that it enables, at least, the partial recovery of the adulterant.

Careful experiments made with other synthetical remedies may result in notably increasing this list of volatile substances.

LABORATORY NOTES.

By Chas. H. La Wall and Robt. C. Pursel.

OIL OF SASSAFRAS.

The large quantity of this oil which is required by soap manufacturers and the liability of its adulteration make this substance of frequent occurrence in the analytical departments.

As the boiling-point covers a considerable range of temperature, the specific gravity, general appearance and odor are all taken into consideration in deciding upon the quality of a sample offered for examination.

Safrol, which at one time was used as an adulterant, is now higher in price than the oil.

It normally constitutes about nine-tenths of the weight of the oil according to the U. S. Dispensatory, and has a specific gravity of 1·108, while the specific gravity of oil of sassafras varies between the limits of 1·07 and 1·09.

Oil which is lighter than 1·07 is looked upon with suspicion by the consumer, as it might indicate adulteration with the fractionated camphor oil, which is used for the purpose.

Some of the consumers also dislike the crystals of safrol which almost invariably separate out of oil of sassafras in cold weather, so it is very hard to suit them, the idea being that oil of a certain intermediate specific gravity is of greater perfuming power than either pure safrol or very light oil.

The distiller of the oil has very little scientific knowledge, his work being done empirically. The oil is usually received in five-gallon cans from the distiller; occasionally a consignment is noticed which has some cans of low specific gravity and others high. This is not necessarily attributable to adulteration, as it often comes from a distiller of good reputation. It is probably due to having the oil stored during cold weather, the safrol separating and settling to the bottom. When redissolved by warming, it does not

mix unless thoroughly agitated, and upon drawing it off without proper care in this respect a variable lot of oil will result.

One experience, however, illustrates how necessary it is to know all the facts pertaining to the subject before arriving at a conclusion.

Almost two years ago, one of the writers examined a lot of five cans of oil of sassafras which had been received from a distiller in Maryland. It was found to be low in specific gravity (about 1·055), and was so reported.

The distiller wrote that it probably had congealed and needed thawing out.

Another examination was made after inserting a stick and thoroughly stirring the contents, to make certain of the absence of any crystals in the bottom. The gravity was practically the same, and the distiller was notified that the oil had been rejected.

He arrived the next day, very much excited, bringing his hydrometer along. Upon being shown the oil he asked for a five-gallon bucket, and, after pouring out about two and one-half gallons, shook the remainder up vigorously in the can, and we took the specific gravity; it was over 1·08, and, when thoroughly mixed, the entire lot was just 1·07, as claimed. It was stated by the distiller at the time, and has been verified by the experience of the writers, that the separation into layers after the oil has crystallized and been thawed out is so marked that the only way to insure a homogeneous product is to pour part of it out before agitating, which agitation must even then be very vigorous.

The distiller also made the statements that congealation was not necessary to produce such a separation, and that pure oil would always separate into three layers of different densities after standing for some length of time.

This was somewhat doubted, but the following experiment was undertaken to decide the matter. A glass-stoppered cylinder, about 30 inches high and 4 inches in diameter, was filled with the oil obtained from the person making the above statement.

It was allowed to stand exactly one year without being disturbed, and the specific gravities were taken of samples siphoned from the top, middle and bottom, with the following results:

Top,	Sp. Gr.	1·06864 at 15° C.
Middle,	"	1·06964 at 15° C.
Bottom,	"	1·06984 at 15° C.

The slight difference, observed after the length of time the sample had been allowed to stand, indicates that the distiller was somewhat mistaken in his facts. The experience gained by his visit was afterward applied practically in the case of a customer who rejected a lot of forty-five cans as low in specific gravity.

A visit was made to the establishment of the buyer and a practical demonstration was afforded his chemist, as follows: A can which had not as yet been tested by them was opened and the specific gravity taken of the first that was poured out, which was about 1·060. When about half of the entire contents had been poured out, crystals of safrol began to appear. The remaining oil in the can was warmed to dissolve the safrol, and upon taking the specific gravity at 15° C., it was found to be about 1·080.

The matter was, therefore, supposed to be settled, but a few days later another complaint was received from the same party, to the effect that upon mixing the whole lot of forty-five cans the gravity was still only 1·06.

A second visit developed the fact that the specific gravity had been taken at the temperature of the room (about 28° C.) and not at 15° C., which is the authorized temperature. A few moments sufficed to chill a sufficient quantity of the oil to 15° C., which showed the specific gravity to be about 1·071.

No further complaints were made.

The following shows the maximum, minimum and mean specific gravity of all samples examined during 1896, 1897 and 1898, up to June 1st:

	Maximum.	Minimum.	Mean.
1896	1·0840	1·0500	1·0654
1897	1·0850	1·0610	1·0736
1898	1·0830	1·0450	1·0713

This represents an aggregate of about 10,000 pounds of the oil as it comes from the distiller.

The color varies from deep yellow to nearly colorless, and there is a difference noticeable in the odor of different lots.

The artificial oil is obtainable in the market, and very closely resembles the natural, so that it is practically impossible to definitely state whether an oil is pure or not; however, there is a very great quantity of oil sold which is not tampered with after leaving the distiller. The guarantee of its purity rests with him.

MILK SUGAR.

One of the tests for the purity of milk sugar, according to the U.S.P., 1890, requires that no brownish or blackish color shall develop within thirty minutes when the milk sugar is sprinkled over the surface of sulphuric acid.

Occasionally a sample is found which does not test as good in this respect and yet polarizes equally as well as a sample which does not show any coloration. Some crystallized milk sugar was obtained and the suggestion offered itself that the presence of thread or string upon which the crystals are allowed to form (as in the case of rock candy) might be responsible for some coloration.

Investigation showed this to be the case; clean crystals from the outer side of the string gave no coloration after being powdered and tested according to the U.S.P. directions, while, in the case of the section across the entire string, the coloration was directly proportional to the thickness of the crystalline mass, or, in other words, to the quantity of thread which had been powdered up with the milk sugar.

Polarization is the safest test, as it can be seen that a good milk sugar might be unjustly rejected under the above conditions.

Perhaps manufacturers of this article might substitute some fiber less carbonizable than that now used, if attention were called to it.

301 CHERRY STREET.

ASSAY OF VALLET'S MASS.

BY HENRY K. THOMPSON, P.C.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 177.

The usefulness of the official formula for Vallet's mass depends upon the formation and preservation of ferrous carbonate, which is insoluble in water, and free from irritating and styptic properties.

The author has made some experiments with the view to devising a method by which the pharmacist can conveniently and with fair accuracy ascertain the amount of ferrous carbonate which Vallet's mass, of his own or other manufacture, may contain.

After several unsuccessful attempts to find shorter processes, the following method of assay was considered satisfactory for the pur-

pose: 1·1573 grammes of the sample were treated with distilled water, the insoluble matter collected on a plain filter and washed with distilled water until honey, sugar, other soluble organic and inorganic substances were removed. The filter and its contents were then transferred to a beaker, mixed with distilled water, and the mixture treated with diluted sulphuric acid until it acquired a distinct acid reaction and effervescence ceased. The contents of the beaker were then poured on another plain filter, and the pulp of the first filter washed on the same with distilled water until the washings failed to react with potassium ferricyanide test solution. The mixed filtrate and washings were then titrated with decinormal potassium permanganate volumetric solution until a permanent pink tint was imparted to the liquid. When 1·1573 grammes of the sample are taken, each cubic centimeter of the solution represents 1 per cent. of ferrous carbonate.

A sample of Vallet's mass made in strict accordance with every detail of the Pharmacopœia was assayed by the foregoing method, for the purpose of learning how much ferrous carbonate the fresh product prepared in this manner should be expected to contain. Every care was taken to lessen the chances of oxidation, which invariably takes place to a greater or less extent. The finished product was looked upon as a fair sample of the preparation. It contained, on an average, 38·66 per cent. of ferrous carbonate. The duplicate analyses of it showed 38·79 and 38·54 per cent. respectively.

There is not sufficient sodium carbonate in the official formula to completely change all of the ferrous sulphate directed therein to carbonate, but by using perfectly pure crystallized sodium carbonate (the U.S.P. directs it to be at least 98·9 per cent. pure), and assuming that it is totally consumed in forming ferrous carbonate; also, that all of the latter is precipitated, and that none is lost mechanically or oxidized in manipulation, the official product should contain 40·54 per cent. of ferrous carbonate. But, as is well known, it is quite impossible to fulfill all of these conditions, and it is probable, therefore, that a sample showing 38·66 per cent. of ferrous carbonate is a fairly good product of the process when carried out on a small scale.

For the double purpose of more thoroughly testing the suggested method of assay and of gaining some knowledge of the quality of the preparations on the market, specimens were procured, from four

manufacturing pharmacists and chemists located in Philadelphia, and subjected to the treatment already outlined. The result of duplicate analyses, in percentages of ferrous carbonate, were as follows:

	I	II	III	IV
	29·03	37·84	49·22	33·12
	28·78	37·62	49·14	33·04
Average	28·90	37·73	49·18	33·08

JAVA QUININE.

By J. B. Nagelvoort.

It will, no doubt, be of interest to the readers of the American Journal of Pharmacy to know that Java quinine, as a market article, is an established fact. The writer, among others, secured some of this first Dutch product for assay. After the many misrepresentations of the ability of the Java factory, it is a duty to report this final success. The prices of Peruvian bark are already on the increase; neglected plantations, lately offered for sale for 1 cent on the dollar, are taken under cultivation again; and if the colonial government will lighten the difficulties, by giving freedom of duty on the raw material, on the chemicals, the sulphuric acid and the caustic soda, needed for the manufacturing of this valuable medicine, this chemical industry will yet become a blessing for the whole island. Twenty-one boxes quinine sulphate were sold at Amsterdam, at the April sale, wholesale, at a minimum of 14·20 f. and a maximum of 15·30 f.; retail, 1 f. per kilogramme, including cans (a Dutch f. equals 40 American cents).

Assay.—One gramme of the sample is deprived of most of its water of crystallization and the possible double salts of the cinchona alkaloids broken up, by warming in the air-bath to 100° C. for half an hour. It is then transferred into a suitable small "Erlenmeyer"; 10 c.c. of water is added to it; the flask is provided with a good cork, and now immersed in water that was warmed to 60° C. The flask, with its contents, is kept in this water, the temperature being constant, for half an hour, shaking frequently. It is then taken out and afterwards again immersed for two hours more in water of a temperature of 15° C., agitating the contents of the flask, as before, from time to time. After this rigid test on the presence of easier soluble secondary cinchona alkaloids, cinchonidin and cinchonin

especially, the fluid is filtered in a small funnel of 2 inches diameter, a filter paper being used, and by rapid filtering little is absorbed. A folded filter, to increase the speed of filtering, is not necessary, sufficient fluid running through for the continuation of the test by tapping the funnel. I never use 2 grammes of the salt under examination and 20 c.c. of water, as I do not require this amount of fluid.

Test-tubes of a little over 10 c.c. capacity on foot, and divided into ½ c.c., are kept for the purpose of examining quinine sulphate by Vierner's process. One of the test-tubes is taken and 5 c.c. of the aqueous mixture is filtered into it; 4·5 c.c. ammonia of 0·96 added and cooled to 15° C., this amount of ammonia being all that was needed to obtain a very nearly clear fluid, as the result of the mixing of the two liquids.

The few cheesy-like flocks, which remained suspended in the fluid, a peculiarity of this test, dissolved entirely after the addition of another 0·5 c.c. of the same ammonia.

I have been very particular in describing the above details, because this Java quinine sulphate is hereby proven to be an article of unusual excellence and much purer than what the pharmacists in the United States are getting. In its fresh state it was found to contain 14 per cent. water of crystallization.

A COLORING MATTER FOUND IN SOME BORRAGINACEÆ.[1]

By J. B. S. Norton.

Some time last summer Mr. J. G. Smith, of the Division of Agrostology, sent a small specimen from Grant County, New Mexico, to the Missouri Botanical Garden for identification, which I decided to be *Plagiobothrys Arizonicus*, Greene. Mr. Metcalfe, who collected the plant, says that "when the sheep find a patch of it, it colors their heads red clear to their ears." The herbage of the dried plant had stained the letter which enclosed it a violet purple, something like wine stains. Mr. A. M. Ferguson tells me that a plant of Western Texas, doubtless also some species of Borraginaceæ, is known to affect sheep in a similar manner. The New Mexican plant is known there as blood purslane, says Mr. Smith, in a recent letter, and is fine for sheep pasture in the spring.

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[1] Ninth Annual Report of Missouri Botanical Garden, 1898, p. 149.

These facts prompted me to further investigate the matter. I examined the other specimens of the same species, and others of that genus and related genera in the Garden herbarium, and found that a number of specimens had stained the paper in the same way, some through as many as five herbarium sheets. The color spreads through the paper from the mounted plant, though in what manner I have not been able to ascertain.

It is well known that a coloring matter is common in the roots of several species of Borraginaceæ, and the substance is probably the same in all. It is known as alkannin, and is a non-nitrogenous, resinous, purple coloring matter, soluble in oils, alcohol and ether, but not soluble in water.[1]

Alkannin, or alkanet (or alcanet), as the dye is called, is obtained from the root bark of Alkanna tinctoria, which is cultivated in South and Central Europe, for the dye which is used in pharmacy for coloring salves, and for coloring wine and other liquids sold as wine. Alkanet is also an excellent test for resins and oils, to which it gives a red color, and is used in micro-chemistry as a reagent for these substances. The dye is said to give a brilliant violet color, with iron and alum mordants, to linen, cotton and silk, but not to wool. The fact that the wool, on sheep grazing among growing plants, is colored is probably due to the alkannin being dissolved in the oil of the wool. In the Old World alkannin occurs also in quantity of commercial value in Arnebia, Echium, Symphytum, Onosma and Lithospermum.[2]

In a brief examination I have found but a few references to this color in American Borraginaceæ. The color in the roots of species of Lithospermum (the puccoon of the Indians) is well known; and Dr. Gray, in the Synoptical Flora, mentioned one species of Plagiobothrys (P. Torreyi), the herbage of which "gives an abundant violet stain to paper." It is opposed in this character to P. ursinus of similar habit, but "imparting no violet stain to paper." P. tinctorius (Ruiz & Pavon), Gray, *Proc. Am. Acad.*, **20**, 283, of South America, is also described as "papyros violaceo colore tingens."

An examination of the herbarium material of the Garden shows

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[1] The information regarding the properties and uses of alkannin is taken from Tschirch, Angewandte Pflanzenanatomie, The United States Dispensatory and The Century Dictionary.

[2] Engler & Prantl, "Pflanzen familien," 4[3a]; 73, 113, 124, 127.

that the coloring matter is abundant enough to stain the herbarium paper in the following species, chiefly in the roots; Echium vulgare, Eritrichium glomeratum, Krynitzkia barbigera (abundant in leaves), K. Californica (slight), K. maritima, K. micrantha, K. pterocarya, Lithospermum multiflorum, L. strictum, L. spathulatum, L. hirtum, L. canescens, L. augustifolium (not abundant), Plagiobothrys canescens (in leaves), P. nothofulvus (in leaves), P. tenellus, P. Arizonicus (abundant in stem and leaves as well as root), P. Torreyi (very abundant in some specimens, others with hardly a trace).

The coloring matter in the American plants seems to be the same as that derived from Alkanna tinctoria. Though I know of no analysis of any of the American Borraginaceæ, Professor Pammel and myself have obtained the characteristic reactions from the leaves and roots of Plagiobothrys with resin and oils. The color is also very persistent on the hands, after handling the plants. Perhaps some economical use may be made of our American plants.

GLEANINGS FROM THE MEDICAL JOURNALS.

By Clement B. Lowe, M.D.

YELLOW SNOW AND WIND CARRYING POWER.

There was a fall of dirty-colored snow at Engaddi, in Switzerland, not long ago, and instead of taking it as an evil omen, as of yore, the inhabitants proceeded to investigate it. Boiling the snow gave a dirty yellowish water, from which a thick layer of mud-like consistency and appearance was deposited. Testing of this with various chemical re-agents showed that it contained iron in combination with minute quantities of other metals and chemicals, such as are found only in certain minerals rich in iron ore in Hungary. The dust had evidently been lifted by an eddy of wind from the bare plains hundreds of miles away, and carried until it met the falling snowstorm, on which it was deposited to fall with it. The incident is a striking illustration of the possible carrying power of the wind in times of epidemics, the well-known tendency of bacteria to cling to dust particles favoring their transportation in this way. An explanation of the almost simultaneous breaking out of epidemics at points distantly separated may thus be afforded—a much more definite explanation than the usual appeal to indefinite meteorological conditions.—*Phila. Med. Jour.*, April 16, 1898.

A NEW METHOD OF VACCINATION.

Dr. M. Hutchins, in *The Jour. of the Amer. Med Assoc.*, writes in an interesting manner on "Denudation *vs.* Scarification." His plan of procedure is as follows: The point to be vaccinated is cleansed. A piece of cotton as large as the desired denudation is wet with liquor potassæ and laid on, or a little of the fluid is put on with the bottle stopper. After two or three minutes, or as soon as slight burning is felt—it usually does not burn at all—the cotton is removed, if it was used—the soap mixture which has formed with the skin secretions is wiped off with a piece of wet cotton, though this is not essential to success, in order to render the next step easier. Then an ink eraser, a toothpick of soft wood, a pencil rubber, a piece of gauze (the quickest) or a piece of damp cotton is used to rub away the softened epidermis. The friction is slight, the pain is only a little stinging when the sensory nerve filaments become exposed. We obtain in a few seconds a moist, shining surface, often a clear view of the papillary vessels, but no bleeding. The vaccine is now applied and let dry on in the usual way.

The advantages of this method are its practical painlessness and the absence of terrifying instruments. Further, bleeding is a bar to successful vaccination. By scarification it is difficult to stop short of bleeding, while with denudation bleeding is almost impossible. There is also less danger from an undesired infection from instruments or epidermis when this method is employed. As to the results: A good lymph will "take," an unreliable will not. Inoculation was successful in as many cases vaccinated by denudation as by scarification, and increased experience will probably show a much larger percentage of success.

ANTIPYRINE IN SCIATICA.

If injections of antipyrine do not always relieve sciatica, it is because they are not made deep enough, so as to bring the analgesic actually into contact with the nerve-trunk.—KUHN, in *Sem. Med.*, March 10.

FOR VOMITING OF URERINE ORIGIN.

℞.	Menthol,	5 grains.
	Elixir of pepsin,	1 fluidounce.
	Tincture of opium,	2½ fluidrams.

Dose: Ten to twenty drops, to be taken before meals.—*Lutaud.*

TÆNIAFUGE.

℞.	Salicylic acid,	7 grains.
	Ethereal extract of male fern,	9 grains.
	Oil of cinnamon,	10 drops.
	Gum arabic,	2 drams.
	Simple syrup,	1½ fluidounces.
	Distilled water,	3 fluidounces.

To be taken fasting, in the morning, in two parts, with an hour's interval.—*Phil. Med. Jour.*, April 9, 1898.

ENGLISH IN PRESCRIPTION-WRITING.

We think it time that Latin should not be used any longer in writing prescriptions. There is not one in a hundred physicians who can write Latin correctly, and a prescription that is one-half or one-fourth in Latin and the rest in English is bastardly ridiculous. We all hide our philologic ignorance under contractions that lead to ambiguity and even danger, and, when we can no longer hold out with our wretched sham, we are compelled to plunge into English for the directions. All arguments for this mediæval nonsense do not amount to a pinch of snuff. As for hiding the knowledge of the drug from the patient, and the advantage of patients travelling abroad, the facts need only to be looked squarely in the face, and the argument for Latin becomes a bad boomerang. The practice is a pompous bit of humbug, which should be left to mediævalists and not scientists. So soon as we get our therapeutics out into the daylight of common sense and genuine science, we shall surely dispense with the sorry jumble of bad Latin and poor English, illustrated by nine-tenths of the actual prescriptions on file to-day at the drug stores.—*Philad. Med. Jour.*, April 19, 1898.

RECENT LITERATURE RELATING TO PHARMACY.

ASSAY OF BELLADONNA LEAVES.

W. A. Puckner (*Pharm. Rev.*, 1898, p. 180) proposes the following modification of C. C. Keller's Method (*Schweiz. Wochenschr. f. Chem. u. Pharm.*, 1894; AMERICAN JOURNAL OF PHARMACY, 1894, p. 42) for the assay of those alkaloidal drugs where it is necessary to use relatively large quantities of material, as, for instance, with belladonna, henbane, etc-

To 10 grammes of drug, dried and powdered, as by Keller's method, contained in a flask of 75–100 c.c. capacity, add 50 c.c. of

the light chloroform-ether mixture used in Keller's method and 5 c.c. of ammonia water (10 per cent.), cork well and shake at frequent intervals for one hour. The mixture is now transferred to a small percolator, improvised by drawing out a test tube of about 50 c.c. capacity (a rather narrow one, diameter about 20 millimeters being preferred) provided with a plug of cotton at the outlet, and the percolate received in a separator. When all has passed, another 25 c.c. of light chloroform-ether are passed into the flask, and with it the remainder of the drug transferred to the percolator, and, when this has passed through, another 25 c.c. are used in the same manner. The ethereal solution in the separator containing the alkaloids from 10 grammes of drug is now treated as outlined in Keller's method, and the assay completed in exactly the same way.

ACETIC ACID AS A MENSTRUUM.

According to E. H. Squibb (*Ephemeris*, 1898, p. 1938), acetic acid has been more extensively used in the past year in the way of applying it to the exhaustion of crude drugs containing active principles. The drugs have been so completely exhausted as to put beyond all doubt the value of this acid as a solvent. It is found that this acid is so effective that a thoroughly representative extract can be obtained which contains such a slight excess of acetic acid that it may be practically disregarded. Even this excess could be gotten rid of by heat if its presence were considered detrimental, but when the dose of the extract in question is considered, the amount of acid present is inappreciable. Moreover, such an acetous extract is found to be permanent, showing no signs of deterioration after a lapse of six or eight months. In the case of drugs containing oleoresins even, the exhaustion by this acid has also proved to be quite complete, which proves that its solvent properties may be regarded as fully efficient for all classes of crude drugs—thus substituting it quite completely for alcohol as a solvent in the preparation of both fluid and solid extracts. The ready miscibility of these acetous extracts with water without precipitation, together with the strength and uniformity that can be obtained by the use of this solvent, offsets the objection that may be raised against the small excess of acetic acid in the finished extract, while the greatly decreased cost warrants the use

of such extracts even though there were most extreme disadvantages against them. Another very important advantage of these acetous extracts is that their active principles are evidently combined with the acetic acid to form salts which are no longer incompatible with many of the prominent medicaments now found in prescriptions. This latter is such an important advantage that it outweighs many minor disadvantages.

TOXALBUMOSES IN CROTON SEED.

In an extended study on the toxalbumoses which coagulate blood, M. Elfstrand gives a brief account of previous investigations on croton seed and its poisonous properties, and also on abrin and ricin. The poisonous albumen of croton seed was extracted with water and a salt solution, after previously removing the fat, etc. with alcohol and ether. The greater portion of the book is devoted to a report of experiments on the effect of croton seed extract on the blood and blood constituents.—"Ueber giftige Eiweisse welche Blut körperchen verkleben." Upsala: Almgvist & Wiksells Boktrycheriaktiebolag, 1897, pp. 182; from *Expt. Sta. Record.*

DETERMINATION OF NITRIC ACID IN DRINKING WATER.

Devarda employs the following method: Evaporate one-half to two liters of the water to be examined to about 300 c.c., add two grammes of pulverized aluminum bronze (containing 59 per cent. of aluminum, 39 per cent. of copper, and 2 per cent. of zinc), and 20 c.c. of potash solution (containing 30 per cent. KOH) free from nitrate. Let stand one-half hour and distill off ammonia into acid with gentle heat.—*Zeitschr. Allg. Osterr. Apoth. Ver.*, 1897, p. 257.

A NEW MILK PRESERVATIVE.

The "Rhodian purifier," which it was claimed would keep milk sweet for several days, in the warmest weather, was found by A. W. Stokes (*Analyst*, 1897, p. 320), to consist of potassium nitrate and water, there being 19 per cent. of the nitrate. It had no merits as a preservative. Its presence in milk is detected when the milk solids are incinerated by deflagration, and the ash if taken up in dilute sulphate gives the nitrate reactions. In testing milk by the Gerber, Leffman-Beam, or Babcock processes a yellow color appears when the milk containing this preservative is mixed with strong sulphuric acid, an l minute bubbles of nitrous gas are given off.

A NEW MILK ADULTERANT.

A "secret nostrum for concealing the addition of water to milk" was found by A. W. Stokes (*Analyst*, 1897, p. 321) to contain 1·96 per cent. of dextrin. It was claimed that 20 per cent. of water could be added to milk without fear of detection, provided four ounces of the material was added per pint of milk. It was said to be used extensively in Australia. It could be detected by the small amount of unaltered starch it contained, which gave the iodine reaction.

ADULTERATION OF ANISE.

In addition to the fact that commercial anise contains sometimes conium, as stated recently (in *Pharm. Centralh.*, 1897, p. 308) Volkart (*Schweiz. Wochenschr. f. Chem. u. Pharm.*) adds the fact that such adulterated anise contains also a considerable amount of the bluish-green fruits of *Setaria glauca*, Beauv. (Paniceæ) and commonly also the fruits of Indian grass or hairy rush (*Echinochloa crus galli*, Beauv.)—*Pharm. Centralh.*, 1898, p. 297.

SAFFLOWER.

Under the name of Safflower, the *Ber. d. D. Pharm. Gesellsch.*, 1898, 27, is authority for the statement that some thousands of kilogrammes of ray flowers of Calendula are shipped from China to America, and that they are not used as a dye-stuff, but employed in medicine.—*Pharm. Centralh.*, 1898, p. 297.

NUTMEGS.

The prevailing opinion is that nutmegs are limed for the purpose of destroying the germinating qualities of the seeds. Tschirch now says (*Schweiz. Wochenschr. f. Chem. u. Pharm.*, 1898, p. 21) that the object of liming is solely to protect the seeds against the attack of insects, as the germinating vitality, even without this treatment, is soon lost.—*Pharm. Centralh*, 1898, p. 297.

OLEUM MYRISTICÆ.

Expressed oil of nutmeg is not expressed in the Molucca Islands from the broken and much deteriorated nutmegs, but the operation is now carried on in Europe by the employment of machines. In Holland it is obtained by the use of pressure, whereas in Germany it is extracted. In both cases, however, it is liable to adulteration with animal and vegetable fixed oils. The pressed cake from which

the expressed oil is obtained still contains from 8 to 10 per cent. of an ethereal oil, which is employed as a substitute for the much dearer (nine times) oil of mace from which, according to Roller, it is hardly distinguishable.—KRASSER, in *Zeitschr. d. Oesterr. Apothekervereins*, 1897, 825; abs. in *Pharm. Centralh.*, 1898, p. 297.

EDITORIAL.

WAR REVENUE BILL.

It is long ago that Alexander Hamilton, the great financier of the young American Republic, wrote "that a complete power to procure a regular and adequate source of revenue, as far as the resources of the community will permit, may be regarded as an indispensable ingredient in every constitution." One of the first acts by the first Congress in 1789 was the Tariff Act of that year. In this act were contained duties for revenue and duties intended to give protection to American industries. Since that time the tariff has been a matter at issue between the two great political parties, and was only superseded by the slavery question between 1842 and 1860. During all these years duties have been raised from time to time, for the purpose of providing an increase of revenue as well as for improving the defences of the country. Thus the Act of 1792 raised duties to provide means for increasing the army after St. Clair's defeat in the Indian war. The Act of 1797 was needed to provide for the payment of certain installments of the foreign debt then coming due. In 1800 duties were increased to pay interest on a loan authorized in view of a possible war with France. In 1804 an addition of 2½ per cent. on all duties yielding the "Mediterranean Fund" for carrying on the war with the Barbary Powers was made. In 1812 all duties were doubled for the purpose of carrying on the war of that year. In 1861 the Morrill Tariff was introduced. This was one of a series of "war measures" occasioned by the Civil War, in every year of which several acts for increasing duties were passed, the most important of which were the general tariff acts of 1862 and 1864.

The war with Spain, contrary to Spanish opinion, has cemented the nation as nothing but war apparently could do. It was generally realized from the start that the war would necessitate an increase of revenue for the Government, and that the American people, as a whole, must contribute toward this end. In April a war revenue bill was introduced by the Ways and Means Committee of the House. As was to be expected, it needed considerable alteration, and we find numerous changes in the bill as finally adopted by the House and Senate, and signed by the President on June 13th. There has been a notable compromise in the coinage of seniorage and in the issue of bonds. There were minor compromises on other subjects in dispute, such as the size of package of smoking and chewing tobacco. The change in the measure which is most satisfactory to the drug trade, as constituting that part of the community most vitally affected, is the reduction of the rate of tax on medicinal and proprietary articles from 4 cents on the dollar of retail price to 2½ cents. Mr. Dingley, in explaining the Conference Report on the War Revenue Bill (*Cong. Rec.*, p. 6,426) said, relating to that portion which affects the apothecary:

"The Senate modified the House proposition relating to the tax on proprietary medicines, and in modifying it introduced new elements which placed the whole subject within the jurisdiction of the conferees. The result has been that after a careful investigation the conferees have accepted the general scope of the proposition contained in the Senate amendment confining the tax to proprietary medicines, and the conferees of both Houses have concurred in reducing the tax on proprietary medicines and perfumes, etc., about one-third. Both the Senate and the House conferees were satisfied from all the investigations that have been made, that although the tax was precisely the same in the House Bill as in the Revenue Acts from 1864 to 1872, yet that under existing conditions it was too large, and therefore it has been reduced about one-third all along the line.

"The Senate amended the proposition for taxing stocks of medicinal preparations on hand, so that they should be stamped only as sold by the retailer, on the ground that there is a large part of the old stocks of druggists throughout the country that is unsalable, and that a stamp tax imposed upon all of that stock would be unjust and unfair. The House conferees readily concurred in that view of the case and accepted the Senate proposition, which imposes a stamp tax upon stocks of proprietary medicines only as the articles are sold by the retailer. So that in that case the tax is only paid by the retailer as he may sell the stock; and if any of it is unsalable, no tax is required upon it.

"The Senate amendment imposing a stamp tax on all articles sold under a trade-mark or patent, or special proprietary name, was strenuously objected to by the House conferees, and went out."

As indicating the important features for the apothecary to bear in mind, the following succinct account, issued by Smith, Kline & French Company, may be of value:

Schedule B.

A.—Medicinal Proprietary Articles and Preparations.

B.—Cosmetics and other similar articles.

Proprietary Medicines.—SEC. 20. That on and after the first day of July, eighteen hundred and ninety-eight, any person, firm, company or corporation that shall make, prepare, and sell, or remove for consumption or sale, drugs, medicines, preparations, compositions, articles, or things, including perfumery and cosmetics, upon which a tax is imposed by this Act, as provided for in Schedule B, without affixing thereto an adhesive stamp or label denoting the tax before mentioned, shall be deemed guilty of a misdemeanor, and upon conviction thereof shall pay a fine of not more than five hundred dollars, or be imprisoned not more than six months, or both, at the discretion of the court; Provided, That no stamp tax shall be imposed upon any uncompounded medicinal drug or chemical, nor upon any medicine sold to or for the use of any person which may be mixed, or compounded for said person according to the written recipe or prescription of any practicing physician or surgeon, or which may be put up or compounded for said person by a druggist or pharmacist selling at retail only. The stamp taxes provided for in Schedule B of this Act shall apply to all medicinal articles, compounded by any formula, published or unpublished, which are put up in style or manner similar to that of patent, trade-mark, or proprietary medicine in general, or which are advertised on the package or otherwise as remedies or specifics for any ailment, or as having any

special claim to merit, or to any peculiar advantage in mode of preparation, quality, use or effect.

Rate of Stamp Tax:

Articles retailing 05 cts.—1/8 of 1 ct.

Articles retailing 10 cts.—1/4 of 1 ct.

Articles retailing 15 cts.—3/8 of 1 ct.

Articles retailing 25 cts.—5/8 of 1 ct.

Articles retailing over 25 cts.—5/8 of 1 ct. for each 25 cts. or fractional part thereof.

C.—Chewing Gum or Substitutes—4 cents upon each box of retail value of $1.00 or fractional part thereof.

D.—Sparkling and other Wines—one pint, 1 cent; over one pint, 2 cents.

Articles on hand July 1, 1898, shall be subject to above rates of stamp tax, but dealers who are not manufacturers will not be required to affix the stamp *until the article is sold at retail.*

Penalty for evasion of stamp taxes:—Fine not over $500 or imprisonment not exceeding six months.

Druggists who are Dealers in Cigars and Cigarettes are affected by the Revenue Bill as follows:

On all stock on hand on the day succeeding the date of the passage of the Revenue Bill in *excess* of 20,000 cigars or cigarettes and 1,000 pounds of manufactured tobacco, return must be made under oath and delivered to the collector or deputy collector for the proper Internal Revenue District, within thirty days after the passage of the bill. Those having less than the above quantities in stock at time of its passage are not affected by this law.

Miscellaneous Stamp Taxes.—In addition to the stamp taxes already enumerated, the following are imposed:

On bonds, debentures, certificates of indebtedness, 5 cents on each $100 of face value.

On sales or agreements to sell, shares or certificates of stock, 2 cents on each $100.

On sales or agreements of sale of any products or merchandise at any exchange, 1 cent on each $100 of value.

On bank checks, drafts, certificates of deposit not drawing interest, and money orders of all kinds, 2 cents.

On each bill of exchange (inland), draft, certificate of deposit, drawing interest, promissory notes, 2 cents on each $100.

On each foreign bill of exchange and letter of credit, 4 cents on each $100.

On each bill of lading or manifest for goods sent by freight or express within the United States, 1 cent.

On each telephone message, costing 15 cents or more, 1 cent.

Doctor of Pharmacy is a new University degree which will be conferred by the School of Pharmacy of Paris.

Extract of Licorice—A sample of purified extract of licorice yielded, according to the *Helfenberger Annalen*, 1897, the following amount of constituents: water, 24·55–33·11 per cent.; ash, 6·52–11·20 per cent.; glycyrrhizin, 13·18–20·71 per cent.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

A TEXT-BOOK OF BOTANY. By Dr. E. Strasburger, Dr. A. F. W. Schimper, Dr. H. Schenck and Dr. Fritz Noll. Translated from the German by Dr. H. C. Porter. With 594 illustrations, in part colored. London and New York: Macmillan & Co. 1898.

When the first edition of Strasburger's (and his associates at Bonn) "Lehrbuch der Botanik für Hochschulen" appeared in 1894, it was a matter of congratulation among botanists that such a novel and valuable work was published. That this volume was appreciated by botanists everywhere is apparent from the fact that the first edition was exhausted within a year. No one who is familiar with the German language, and has perused the original edition, can help but be struck with the conciseness and terseness of its contents, and wonder that so much could be put into but 558 pages. The task of the translator, it must be admitted, was herculean, and that he has given us a literal translation, adhering closely to the German, making neither alterations nor omissions, botanists and others not at home in the German language, and who ought to have the book, will appreciate.

The contents are divided into two parts, viz.: Part I, General Botany; and Part II, Special Botany. Under general botany are two sections: (1) morphology, including external morphology and histology, and anatomy; and (2) physiology. Under Part II are considered the cryptogams and phanerogams. The whole work is teeming with useful information for the apothecary as well as the botanist, and it is not too much to say that every intelligent pharmacist ought to have a copy for reference. In the part treating of the phanerogams are given no less than fifty or sixty illustrations (many of which are colored) of our common poisonous plants. The extreme value of this part of the work may be better appreciated by quoting the remarks at the end of the N. O. Umbelliferæ:

"POISONOUS.—*Conium maculatum*, the Poison Hemlock (*Fig. 523*), a glabrous herb, often more than a meter in height, with hollow stems and dull-green decompound leaves. The lower part of the stem is very frequently, but not always, purple-spotted. The plant is easily recognized by the wavy crenate ridges of its short, laterally-compressed fruit, and also by its disagreeable odor when bruised (resembling that of mice). *Cicuta virosa*, the Water Hemlock (*Fig. 522*), a large herb growing along the edges of ponds and ditches, is one of the most dangerous of poisonous plants. It has a turnip-like white *rhizome, full of internal cavities*, and large tripinnate leaves, with narrow lanceolate, serrate leaflets. The small white flowers are aggregated in compound umbels and produce sub-globose fruits. *Berula augustifolia* and the different species of *Sium* and *Oenanthe* are less poisonous; they are all marsh or aquatic plants. The last-named genus is easily distinguished by the absence of a carpophore. *Sium latifolium* (*Fig. 524*), which is frequently found in company with the Water Hemlock, has simply pinnate leaves, with lanceolate, sharply serrate leaflets. The Fool's Parsley, *Æthusa cynapium* (*Fig. 525*), a common weed in gardens, produces an intoxicating effect when eaten. It differs from the true parsley in having white instead of yellow flowers, *one-sided, three-leaved* (instead of six- to eight-leaved) *involucels*, and an odor of garlic."

Likewise, under Bacteria and Fungi, there are illustrations and information

which it would be difficult to secure without procuring a great many books—and even then this assimilated matter by these collaborators with Strasburger at Bonn would not be had. The part on the cell reveals the master-hand of Professor Strasburger, by whom it was written, and is an authoritative study on this subject.

UNTERSUCHUNGEN ÜBER DIE WASSERAPPARATE DER GEFÄSSPFLANZEN. Inaugural Dissertation der Hohen Philosophischen Facultät der Universität Marburg zur Erlangung der Doctorwürde vorgelegt von Otto Spanjer. Mit einer Tafel. Marburg, 1898.

The author has investigated the anatomy of the water pores of angiosperms, and endeavored to ascertain if there are not a number of anatomical types with different mechanical functions. The author distinguishes from the differences in the behavior of the fibro-vascular bundle, nature of the thickening of the cylinder sheath and character of the epithem, the following types: I. Type being Fuchsia, also Primula. II. Type as in Rosaceæ. III. Water pores in which epithem is not present, as in *Phaseolus multiflorus* and *Anamirta cocculus.* IV. Epithem not developed, and transpiration takes place through the side walls of the trachea, as in *Orchis maculata.* V. Type as in Nasturtium. VI. Water pores as in *Filicineæ.*

ANNUAL REPORT ON THE YEAR 1897. By E. Merck. March, 1898.

This publication, like that of previous years, contains a report on the composition, origin and applicability of the newer remedies. It contains, also, a bibliographical index, general index, index of diseases, symptoms and indications for treatment; approximate prices of the principal remedies specified in the Report, all of which tend to enhance the value of the publication.

Under new drugs, mention is made of *Cortex Johimbehe*, the product of an Apocynaceæ, which is used as an aphrodisiac by the aborigines in the Cameroons. *Cortex Calliandræ Houstoni* (Pambotano), a substitute for quinine, which contains, according to G. Pouchet, besides saponin, an alkaloid and a resinous body. *Cortex Radicis Anchieteæ Salutaris*, a much-valued Brazilian remedy for scrofula, herpetic skin diseases, etc. *Herba Commelinæ Tuberosæ*, to the hæmostyptic properties of which attention has been repeatedly drawn by Alfonso Herrera (AM. JOUR. PHAR., 1897, p. 290). *Herba Erysimi officinalis*, which seems to have valuable properties in the treatment of catarrh of the larynx, being preferred to aconite preparations on account of its harmless nature and the rapidity and certainty of its action. *Radix Chlorostigmatis Stuckertiani*, a drug possessing powerful galactagogic properties. It contains an alkaloid, the chemical composition and pharmaceutical properties of which nothing exact is known as yet.

CHICORY GROWING AS AN ADDITION TO THE RESOURCES OF THE AMERICAN FARMER. By Maurice G. Kains. Washington: Government Printing Office.

This report also contains chapters on the adulteration and chemical analysis of chicory. The Department confidently recommends the cultivation of chicory in the mid-northern belt of our country.

OSSERVAZIONI SULLA ANALISI ELEMENTARE. Nota del ocio Icilio Guareschi e Dottor Ernesto Grande.

This is a contribution from the pharmaceutical and toxicological chemical

laboratory of the University of Turin, on the determination of the nitrogen in organic substances.

STUDIES ON THE CENTRAL AND PERIPHERAL NERVOUS SYSTEMS OF TWO POLYCHÆTE ANNELIDS. By Margaret Lewis. Reprint from Proc. Am. Acad. Arts and Sci., April, 1898.

This is a contribution from the zoological laboratory of the Museum of Comparative Zoology at Harvard College, under the direction of E. L. Mark. The author finds, among other things, a centrosome in the ganglion cells. This argues for the function of the centrosome other than that of an organ of division, and is in favor of its being a permanent cell organ.

THE ORTHOPTERAN GROUP SCUDDERIÆ. By Samuel H. Scudder. Reprinted from the Proc. Amer. Acad. Arts and Sci., April, 1898.

The author has examined more than 650 specimens of the genus Scudderia alone.

AMERICAN PHARMACEUTICAL ASSOCIATION.

The following announcement from the Chairman, Dr. Ed. Kremers, of the Committee on Scientific Papers of the American Pharmaceutical Association has been received :

In order that the members of the American Pharmaceutical Association may derive the greatest possible benefit from the papers to be presented before the Scientific Section at the Baltimore meeting of the Association, the committee charged with the work of the Section desires to make the following announcement :

(1) Committees in the past have not always been able to arrange the programmes to their own satisfaction or that of others, largely because many persons who desired to present papers did not send to the committee the necessary information. The committee for 1898, therefore, requests that an abstract of each paper to be read before the Section be sent to the Chairman on or before August 15th. Inasmuch as an abstract can be prepared even before the paper is in final shape for reading or publication, this request does not seem to involve any hardship or injustice. In arranging the programme, preference will naturally be given to those papers whose authors have complied with this request.

(2) Authors of papers are further requested to state on the abstract how much time they will require for a satisfactory presentation of their subject. By adhering strictly to the ten-minute rule, some authors have had time to read their papers twice within the allotted time, whereas others with broad subjects were hampered in their presentation through lack of time, even if the time allotted according to rule by the chairman was graciously extended by the Section. In the presentation of papers, authors will please bear in mind that a more general presentation of many subjects is of greater value to a mixed scientific audience than a discussion of a host of details, which, though very valuable, may interest only very few.

(3) The object of scientific gatherings is not so much to read papers, for they can be read more satisfactorily at home when in print. The principal object of such gatherings is to bring men interested in related lines of work together

for expression and exchange of opinions, both formal and informal. It lies within the province of the council to see that sufficient time is left between the sessions to permit the latter. It is the duty of the Section committees to see that the former is possible. The Committee on the Scientific Section, therefore, desires to urge persons who have papers to read, whenever possible, to consider their presentation as an introduction to a more general discussion, *i. e.*, to omit unessential details in the oral report, so that greater emphasis may be laid on the outline of the work accomplished, thus evoking, if possible, a discussion by others. It will aid the committee greatly if authors will mention on their abstracts the name or names of members of the Association who are sufficiently familiar with their work to participate in a discussion, that they may be notified beforehand that the subject will come up for such discussion.

The committee is fully aware that this cannot apply in all cases, and that all papers cannot be treated alike. It hopes, however, that all members interested in the work of the Section will assist the committee in making its sessions as profitable as possible.

PENNSYLVANIA PHARMACEUTICAL ASSOCIATION.

The twenty-first annual meeting of the Pennsylvania Pharmaceutical Association convened in the Buena Vista Hotel, Franklin County, Pa., on Tuesday, June 21, 1898. The first session was called to order by President J. H. Redsecker, at 8 P.M. About 100 persons were present. The President introduced H. J. Mentzler, of Waynesboro, who delivered an address of welcome, calling attention to the historic associations of the place, and delivering to the President the key of Franklin County. The President called upon Professor Lowe to respond to the address. Credentials were received from delegates from the New Jersey and Delaware State Pharmaceutical Associations, and from the National Wholesale Association.

The President then delivered his annual address, which was remarkable in many respects. Briefly reviewing the progress of pharmacy in the State, and calling attention to the modes of dealing with the problems that beset the retail druggist, he said, in part, the following:

"Those of us who were present at the meeting at the Delaware Water Gap a year ago, will recall with what gratification we received the news of the final passage through the Legislature of the amendment to the Pharmacy Law. Immediately after its passage the Governor was called on by a committee, which urged him to give the bill his official sanction. Your legislative committee also took prompt action in securing petitions to the same effect; but, notwithstanding all these efforts, he vetoed the bill on the 20th of June last.

"As the present law has been considered defective in some particulars, and impossible of enforcement by reason of the difficulty of procuring evidence and the lack of funds to conduct prosecutions for the violation of its provisions, I would suggest that a new bill be drafted for presentation to the next Legislature, eliminating the objectionable features of the present law and incorporating others which would be valuable. In my judgment, a law should be framed on the lines of the Medical Examiners' Bill, creating a State Pharmaceutical Council, to which should be submitted for approval the examination

questions, and providing that all fees received for examinations and registrations be paid into the treasury of the State, and all expenses incurred by the State Pharmaceutical Examining Board in carrying out the provisions of the law be paid by warrants drawn on the State Treasurer. The law should also provide that, after a certain date, say three or four years after its enactment, every person applying for a registered pharmacist's certificate, to enable him to carry on and conduct a retail pharmacy, must have had a practical experience of not less than four years in a retail pharmacy, and be a graduate of an accredited college of pharmacy which has a course of studies of not less than three years.

"The creation of a Pharmaceutical Council, to which the examination questions would be submitted for approval, would prevent any suspicion of unfairness, catch questions or favoritism on the part of the Board, and, as the law is clearly in the interests of the State, the revenue derived from it should accrue to the State, and the expenses incurred in enforcing its provisions should be paid out of its treasury. We cannot think that any one, believing in the higher education of the pharmacist, will question the propriety of registering, after a certain time, only those who are graduates in pharmacy.

"In March last a Pure Food and Drug Congress was held in the city of Washington to consider a proposed National Food and Drug Law. Among the members present from our Association were the members of the Board of Pharmacy, Mr. M. N. Kline, ex-President John F. Patton and myself. Professor Remington was appointed a delegate by the Governor, but was unable to be present. Druggists from a number of States were present. After the first session the pharmacists in attendance held a conference, and while it was the consensus of opinion that any law placing pharmacy under the Department of Agriculture was most objectionable, it was the decision of the conference that as some law would be passed in which the inspection of drugs would form a part, it would be better to try and have the proposed law so amended as to make it less objectionable than it otherwise might be. Hence, amendments were submitted by Mr. Kline and unanimously agreed to, and he was selected to present them to the Congress. After considering the bill in Congress for some time and making little progress, it was finally referred to a committee for consideration. Mr. Kline was made a member of this committee, and we were most fortunate in having him there. Too much praise cannot be accorded him for the faithful work that he did, and for his tact and ability. Every objectionable feature was stricken from the bill, and every amendment, as agreed on in conference by the pharmacists, was incorporated. One important amendment inserted was to secure the appointment of a pharmaceutical chemist for the department, under whose direction the inspection of drugs would be conducted. The bill has been introduced in both House and Senate, and will, no doubt, eventually be made a law.

"I would also call your attention to the necessity for greater effort in securing an increased membership of our State Association. I fear that the promised 100 new members will not materialize this year. The Association has been doing good work for the pharmacists of the State, and every man of them should be members and assist in maintaining the organization. If we could get them to attach themselves to the Association and form a compact and co-operating body, we would have a lever by which, based on justice and equity,

we could move the pharmaceutical world. Until some such organization is effected, we shall drift along tossed by every wind and current that affects trade. Instead of controlling circumstances, we shall be controlled by them. Not being a member of the National Wholesale Druggists' Association, I can the better refer to it as one worthy of emulation. Through their various committees they act as one man, and usually get from proprietors and legislators whatever they ask for in fairness. As an illustration of thorough organization and united action, let me remind you that in 1893 the Ohio, Indiana and Kentucky Wholesale Druggists' Association, an organization within the National Association, resolved not to handle a certain proprietary preparation because the manufacturers would not enter into the rebate agreement, and they were compelled to handle it at a loss. It was not long before the manufacturers, realizing that the jobbers were the natural distributors of their goods, promptly announced a change in their prices. They advanced their goods 10 per cent., and made a rebate of 10 per cent. to the jobbers, thus compelling the retailers to pay their obligation to the trade. A few months ago the Paris Green Association announced a price of 16½ cents a pound for green, allowing the jobber a rebate of 1½ cents a pound in largest quantities. The jobbers, through their committee, notified the Paris Green Association that they could not afford to handle the green on so small a margin. In compliance with their demand for a larger rebate, the Paris Green Association announced a rebate of 2½ cents a pound, but advanced the price 1 cent a pound, thus making the retailer pay the rebate and the profit of the jobber. Had there been a thoroughly organized and compact retail association, which could have made demands and enforced them, the manufacturers in these two, and many more instances, would not have placed the payment of their concessions to the jobber on the retailers, but would have paid it themselves.

"While I do not want to touch on the hackneyed theme of cut prices, I am convinced that until we have a thorough organization of the retail trade, which will act as one person through its various committees, we will continue to have demoralization in trade, and proprietary goods will continue to be sold at a loss. The moment the manufacturers realize that the retail trade have combined and are acting unitedly, they will devise some scheme whereby better prices will be obtained, for they are fertile in resources. But, perhaps, these ideas are entirely too Utopian, since the average retailer, whether in or out of the drug business, is but little less than foolish, as each is trying to see how little he can get for his goods, and any attempt to legislate, or by organization make him wise, would be useless.

"I am pleased to note that our relations with the Pennsylvania State Medical Society are of the most fraternal kind. The only delegate present at the late meeting of the Society was our distinguished ex-president, Charles A. Heinitsh, and unusual honors were accorded him, he being invited to a seat on the platform with the officers of the Society. We have been most fortunate in the selection of delegates to the meetings of the Society, and especially are the efforts of last year's work bearing fruit, if we may judge by the tone of the contributions to, and the editorial pages of, the *Pennsylvania Medical Journal*, the official organ of the Society. One writer, in an article of some length, condemns the use of a class of proprietary preparations intended specially for physicians, and urges that 'physicians so inform themselves concerning official and National

Formulary preparations as to make larger and more discriminating use of them, to the gradual elimination of proprietary articles from prescriptions.' In the editorial columns Dr. Kœnig, the editor-in-chief, discussing the patent medicine situation, says:

"'We believe the time is about at hand for the pharmaceutical societies to enter into closer allegiance with the medical profession. Organized pharmaceutical societies should displace the proprietary medicine man at the various meetings of medical societies. If physicians require ready-made preparations other than the pharmacopœial ones, we believe all needs may be supplied by the National Formulary preparations, and these should be prominently brought to the notice of physicians at the annual meetings.

* * * * * * *

"'There is another aspect of the patent medicine question that should receive the attention of physicians and pharmacists, namely, that the public must have a source of supply of simples and general remedies for slight ailments. It cannot be expected of an intelligent public that the services of a physician must be had for every indisposition, when they have been taught the nature of their ailment and know the proper remedy. Medicine is no longer a mysterious calling, and the sooner physicians recognize the higher intelligence of the people of the end of the nineteenth century, the higher will the respect for the profession of medicine grow among laymen.

"'If the various patent, trade-marked and proprietary medicines intended for use by laymen were displaced by preparations of known composition, and their effects published in clear, honest statements, and sold by druggists when called for by the public, the death-blow would be struck to the proprietary remedies whose formulæ, as well as the claims made as to their medicinal properties, in the large majority of cases, are based on falsehood and misrepresentation.

* * * * * * *

"'At the meeting of the State Medical Society, at Pittsburg, in 1897, the entire exhibit of drugs and medicines was placed in the hands of the Pennsylvania Pharmaceutical Society, and not a single trade-marked or patented remedy was shown. While the display was smaller and of a more subdued nature than at many former meetings, it was nevertheless creditable and in absolute accordance with the code of ethics. May we not hope that the Pennsylvania Pharmaceutical Association will rise to the occasion and take advantage of the favorable conditions to bring to the attention of the medical profession of the State the many eligible, though comparatively unknown pharmacopœial official remedies and the National Formulary preparations.'

"Let us hope that the work so auspiciously begun last year may be continued, the suggestion of the editor of the *Medical Times* be carried out, and, with the consent of the Medical Society, all exhibits at their future meetings be under the direction of our Association, thus bringing the two bodies into closer relations."

The address was referred to a Committee consisting of Messrs. Cliffe, Kline and Lowe. The reports of the Secretary, Treasurer, Executive and Entertainment Committees were read. The report of the Treasurer showed a comfortable balance in his hands.

At the second meeting, held on Wednesday morning, at 9.30, the first

item was the consideration of the report of the Committee on Adulterations. F. X. Moerk, the chairman, reported a flagrant substitution of sodium bicarbonate for borax; the package was a regular sodium bicarbonate keg, with the lid reversed, on which was marked 100 pounds powdered borax, etc., while on the obverse side remained the original brand of sodium bicarbonate. Two samples of extract of cannabis indica showed 8 and 40 per cent. of matter insoluble in alcohol. Considerable of the carbolic acid of the markets contains creosote, and the question was asked by the Committee: "Would it not be prudent to notify the jobbers that much of the carbolic acid on the market does not comply with the U.S.P. standard, and that the sale of such acid is illegal?"

The chairman of the Committee on Legislation, Wm. L. Cliffe, had an extended report on the work of the year. From the experience gained in connection with championing the celebrated House Bill No. 303, the Committee is of the opinion that all attempts to obtain a legislative enactment containing the restrictive features of this bill would be futile, and that if it should receive executive sanction, it would be reversed by courts of appeal. Regarding the phenacetin question the report stated: "About the first of the year your Committee, influenced largely by the expressed opinion of the Association at its last meeting, joined forces with a committee engaged in raising funds for the support of the defence in the case of Dickerson *vs.* Maurer, a Canadian phenacetin suit in Philadelphia. The attorneys engaged upon the case had prepared a defence which involved the continuance of the patent, and successful issue will render it invalid. It devolves upon the defence: (1) To show that the claim of the patent is broad enough to include many other and different compounds than the phenacetin furnished to the trade. (2) That in view of the prior publications antedating the patent, the process of manufacturing phenacetin therein described, and the product of that process, do not differ substantially from the patent and patented product, the changes described therein consisting merely in the substitution of the well-known equivalents in one step of the process. About one-half of the necessary fund has been collected, and to proceed without the necessary amount on hand or promised would be simply a waste of money contributed for a specific purpose. What will be done depends altogether upon the securing of the needed funds. It is apropos to state that the strongest financial support of the matter came from those who expressed disapproval of the use of Canadian phenacetin under existing conditions."

There was considerable discussion, particularly with the part relating to the phenacetin legislation. It was moved that the report relating to this subject be referred to a committee of three.

Other reports were read. The report from the Committee on Free Alcohol was received, and, in view of present existing conditions, the committee was discharged. A report was read by Professor Remington, representing the American Pharmaceutical Association, relative to the model pharmacy law. After considerable discussion, the general features of the bill, as presented by the Section on Pharmaceutical Education and Legislation of the American Pharmaceutical Association, were approved.

The delegates to the various associations read their reports, viz.: American Pharmaceutical Association, by Jacob A. Miller; New York State Pharmaceutical Association, by J. A. Redsecker; New Jersey Pharmaceutical Association,

by Dr. Weidemann; Maryland Pharmaceutical Association, by Dr. A. W. Miller; State Medical Association, by C. A. Heinitsh. The Committee on Papers and Queries presented a report through its chairman, C. B. Lowe. The Auditing Committee found the Treasurer's report correct, and commended his efforts in securing membership fees due the Association.

The third session was held on Thursday morning, and was devoted mainly to the reading of scientific papers. Some reports were read, viz.: on "The Glasgow Conference," by Prof. Joseph P. Remington, and on "The Flora in the Vicinity of Buena Vista Hotel," by Dr. A. W. Miller.

The following officers were elected for the ensuing year:

President, Mahlon N. Kline, Philadelphia; First Vice-President, Louis Emanuel, Pittsburg; Second Vice-President, D. J. Thomas, Scranton; Treasurer, Joseph L. Lemberger, Lebanon; Secretary, Jacob A. Miller, Harrisburg; Assistant Secretary, William L. Cliffe, Philadelphia; Executive Committee: Charles L. Hay, Du Bois; Wilbert F. Horn, Carlisle; Cyrus Jacoby, South Bethlehem.

While waiting for the Section on Papers and Queries, Professor Remington introduced Professor Simon, of Baltimore, who responded in some fitting remarks.

John F. Patton read a paper on "Pharmaceutical Organization," in which the author called attention to the advantages and benefits accruing to the pharmacists in their respective State associations, as also in the American Pharmaceutical Association. In reply to the query on "The desirability of the manufacture of a line of proprietary articles under the auspices of the Association for sale to its members at a discount," John F. Patton said: "It is not good business policy or sound ethics to sell any medicine under one's own name and not made by one's self. The responsibility is put upon us of knowing what we dispense. Let us, then, be able to vouch for the excellence of the products of our laboratory and of the therapeutic value of what we compound."

A short abstract of an article on "Saffron" was given by Henry Kraemer. The author illustrated his remarks with specimens and tests, and called attention to the advisability of the Pharmacopœia including in its tests a microchemical or chemical test with sulphuric acid, and also a characteristic botanical description distinguishing the product of crocus from carthamus.

Mr. Lemberger remarked on the fact that there was less adulteration in the saffron on the markets to-day than formerly. Dr. Miller said that saffron was largely used in coloring noodles. Mr. Lemberger said that the yolk of egg was largely used for the same purpose. Isaac M. Weills said that he had sold the American saffron for a similar use.

The next paper, on "The Volatility of Some of the Newer Remedies," by Prof. Frank X. Moerk, is printed in full on page 335 of this issue.

F. W. E. Stedem read a paper on "Cheaper Solvents."

The author experimented with the use of acetic acid and benzin. The following table is self-explanatory:

Name of Drug.	Quantity of Drug used in Grammes.	Amount of Menstruum used in C.C.	Amount of Extract Obtained in Grammes.	Cost of Drug	Cost of Menstruum.	Cost of Extract.	List Price.
Ergot . .	250	500	100	$0.18	$0.18	$0.09	$ .56
Gentian .	500	1,200	380	.14	.35	.035	.24
Belladonna	500	1,000	210	1.30	.32	.23	.30
Cascara . .	500	1,000	250	.18	.32	.06¼	.30

The menstruum used was 40 per cent. acetic acid. The author also exhibited preparations of Tinct. Opii Deod. which had been treated with common petroleum benzin instead of ether.

Professor Remington called attention to the fact that Tinct. Opii Deod. so made had an odor of some of the lower boiling products. Mr. Lemberger stated that he did not recognize the odor in the preparation submitted. Mr. Cliffe called attention to the fact that some of the manufacturers of assayed drugs, in supplying the drug for the manufacture of Tinct. Opii Deod., extracted it previously with benzin. Professor Remington said that the use of the benzin at this point in the operation was better than at the end, because the objectionable features were apparently overcome.

Dr. Clement B. Lowe read a paper entitled "The Influence of Drugs upon History and Civilization." He said that the influence of drugs had been manifested in several ways, viz.: (1) In promoting discovery and geographical knowledge by the search for costly drugs; (2) in opening countries to commerce and promoting intercourse between different nations; (3) in the stimulation of agriculture and commerce through their introduction into new countries; (4) in rendering habitable unhealthful parts of the world; (5) in creating new industries; (6) in influencing favor, as presents; (7) unfavorable influences upon the world. Dr. Miller remarked on the value and interest in the study of Materia Medica as presented by the author.

The remaining papers were read on Friday morning.

The first paper was on Laboratory Notes, by C. A. La Wall and Robt. C. Pursel. This is printed in full on p. 340 of this issue.

Louis Emanuel had a note on the "Sale of Poisons." In his opinion it is the duty of the Pharmacy Board to find out which of the proprietary preparations are poisonous, so that their sale may be properly regulated. He would distinguish between proprietary remedies and proprietary poisons; *e. g.*, Rough on Rats, while commonly considered a proprietary remedy, is really a proprietary poison. Louis Emanuel also had several papers relating to the "Work of the Pharmacy Board." While a practical examination was desirable, it did not seem feasible as yet. The query, "How Can a Fuller Knowledge of the Pharmacopœia be Disseminated among Physicians?" was considered in a paper by D. J. Thomas. After enumerating some of the causes which have led physicians to depart from the use of the Pharmacopœia as an auxiliary guide in their practice, the author made some recommendations which he thought would apply as a remedy to this condition. (1) He recommended that the State Pharmaceutical Association exercise its influence in getting medical colleges to attach more

importance to the Pharmacopœia and National Formulary. (2) That every city and large town should have pharmaceutical societies, not only for the mutual improvement of its members, but also for the purpose of conferring with medical societies. (3) That the work begun by the Association two years ago, at the meeting of the State Medical Society, should be continued, and that funds should be appropriated by the Association for defraying the cost of an exhibit of Pharmacopœia and National Formulary preparations at the annual meetings of the State Medical Society.

W. H. Reed suggested a plan for stopping and preventing the *cutting of prices* on proprietary medicines; the plan being for the proprietors to establish agencies throughout the country, these to be kept under the manufacturers' control as to methods of doing business, such as uniform price, to whom to sell, etc. "To these agents should be given a prescribed territory in which to sell goods, and under no circumstances allow any competition between these servants for business. These agents may be selected from the wholesale druggists, retail druggists or otherwise, but the disposal of these wares *must be* under the immediate control of the manufacturers or their association."

In a paper on "Suggested Amendments to the Pharmacy Law," Charles T. George said that the law should be so amended that the Board should have power to require an oath or affirmation from the applicant as to the truthfulness of his application for examination before a Notary Public or Justice of the Peace. It should be made or considered to be a felony for any person to fraudulently represent another, with the view of successfully passing an examination for one ignorant of the profession of pharmacy for a financial consideration, whether it be before the Pharmacy or Medical Boards of this Commonwealth. The Board should also have the power of annulling all certificates when sure that they have been obtained by false representation or fraud of any kind. The author also showed, in a paper on the "Vetoed Pharmacy Bill," that the benefits were for promoting the professional interests of the apothecary and of value to the citizens of the State.

Dr. A. R. L. Dohme read a paper on the Chemistry of Aloes. Socotrine aloes assayed 7½ per cent. aloin; Curacoa, 18½ per cent., and Cape Aloes, 4½ per cent. aloin.

Before adjourning an appropriation of $100 was made for the purpose of obtaining a legal opinion from a lawyer of national reputation on the merits of the phenatecin suit now pending.

The social features were well arranged and excellently carried out. The fact that this was a joint meeting with the Maryland Pharmaceutical Association, who were in session but five miles away, at the Blue Mountain House, Washington County, Md., added greatly to the interest and success of the meeting. On Wednesday evening the Pennsylvania delegation drove over to the Blue Mountain House and were received by the Maryland Association, and on Thursday evening the Maryland delegation were received by the Pennsylvania Association at their hotel. At the latter a very interesting musical and literary programme was arranged; of special interest were several recitations by Miss Maggie Maisch, and a surprise in store for the veteran pharmacist, Charles A. Heinitsh. This consisted in the presentation of a gold medal to Mr. Heinitsh, who has just completed fifty years of pharmaceutical service, and his many friends determined to signalize the event by presenting him a testimonial at the joint meeting of the

Pennsylvania and Maryland Associations. Prof. Remington was selected as presenter, and after alluding to his long service and the appreciation in which he was held by his friends, closed with these words: "We honor you as a pharmacist, we respect you as a merchant, but we love you as *a man*." The medal was a work of art; on the reverse were the words, "Pharmacio filios dignos honorat;" surrounded by an olive wreath, "Charles S. Heinitsh, fiftieth anniversary;" and on the obverse, "presented by his pharmaceutical friends, 1898." Charles E. Dohme, of Baltimore, President Redsecker and M. N. Kline afterwards congratulated the veteran; in replying Mr. Heinitsh was scarcely able to control his emotion, as he warmly thanked his friends. The presentation was the incident of the evening, and the remarks of the Maryland members showed that the high regard felt for Charles A. Heinitsh was not confined to Pennsylvania.

On Friday morning the officers for the ensuing year were installed and a memorable, pleasant and profitable meeting came to a close. The next meeting will be held in Philadelphia.

OBITUARY.

Samuel H. French, Jr., who was well known in drug trade circles, died at his residence at Bryn Mawr, near Philadelphia, on April 30th, after a brief illness. He was thirty-seven years of age, being the youngest son of the late Clayton French, founder of the old drug house of French, Richards & Co. After his father's death Mr. French and Mr. Joseph Cave, both of the late firm, engaged in the manufacture of perfumery and pharmaceutical specialties, under the firm name of French, Cave & Co. This company was consolidated with the Smith, Kline & French Company about five years ago, it having existed as a separate concern about one year. After the consolidation of these two companies, Mr. French was retained as a manager in his branch of the business until last June, when he retired from active business. Mr. French was an alumnus of the Philadelphia College of Pharmacy, having graduated in 1882.

Andrew Blair, a highly respected pharmacist, died at his home in West Philadelphia on April 16th, in the 57th year of his age. His father, the late Henry C. Blair, was a most careful pharmacist, special reference having been made to the value of his methods by the late Prof. Parrish in his Treatise on Pharmacy. The son thus received an excellent training in what was to be his life-work. In addition, he took the course at the Philadelphia College of Pharmacy and graduated in 1865. In 1869 Mr. Blair was elected a member of the College, and in 1879 became a member of its Board of Trustees. He was re-elected in 1882, but resigned within the year on account of other duties.

Mr. Blair was well known in pharmaceutical circles, having been a member of the American Pharmaceutical Association and of the Pennsylvania Pharmaceutical Association. Besides he was an occasional contributor to this JOURNAL.

Mr. Blair was a member of the Presbyterian Church and was deeply interested in church work. He was also connected with a number of charitable institutions.

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VALUATION OF CRUDE CARBOLIC ACID.

By Carl E. Smith.

(Report from Research Committee D, Section II., Committee of Revision of the U.S.P.)

The U.S.P. of 1890 characterizes crude carbolic acid as "a liquid consisting of various constituents of coal-tar, chiefly cresol and phenol, obtained by fractional distillation." A test for presence of alkali is given, and another, designed to exclude more than 10 per cent. of the less soluble constituents of coal-tar.

As might be expected, the commercial supplies of this substance vary considerably in composition and strength, the relative proportions of phenol and the cresols, the percentages of so-called tar-oils and of water being particularly subject to variation. Since the cresols have been shown to be about three times more powerful as antiseptics than phenol, it is not a matter of indifference to the consumer whether a product consists chiefly of one or of the others. The non-phenolic constituents of crude carbolic acid, to which the collective name of "tar-oils" has been given, may include hydrocarbons, as naphthalene, anthracene, phenathrene, diphenyl, etc., such bases as pyridine, quinoline, aniline, etc., and other substances still undetermined. Some of these compounds mentioned have undoubted antiseptic value, while others are inert. Water is always found, and, if present in larger quantity than 5 per cent., might be looked upon as an adulteration. With ordinary care in the distillation it will not exceed a fraction of 1 per cent., according to the experience of at least one manufacturing firm within the writer's knowledge.

It has been pointed out by Dr. E. R. Squibb (*Ephemeris*, Vol. I, p. 328) that the solubility test of the Pharmacopœia is impracticable, as it will reject all samples not composed mainly of crystallizable phenol, excluding cresols and xylenols except in small quantities. A sample containing 96 per cent. of the less soluble phenols never came within 16 per cent. of the requirements. This is applied to the test given in the U.S.P. of 1880, which is practically the same as the present one. This latter reads as follows: "If 50 volumes be thoroughly agitated with 950 volumes of water, the undissolved portion should not exceed 5 volumes, or 10 per cent. by volume of the acid." Dr. Squibb proposed the following modification: "Mix 50 volumes of the sample with 1,000 volumes of water in a vessel of 2,000 volumes capacity and shake actively. Allow to separate, pour off the upper milky fluid, add 500 volumes of water to the residue and again skake vigorously and set aside to separate. Again pour off the watery liquid and transfer the residue to a measuring cylinder. The undissolved residue from crude carbolic acid No. 1 should not be more than 5 volumes, from No. 2 not more than 18 volumes, and from the crude carbolic acid of the market not more than 25 volumes."

H. W. Jayne (AM. JOUR. PHARM., 1894, p. 119) states that a 60 per cent. acid answered the requirements of the Pharmacopœia, but after distillation, to remove tarry matter and about 11 per cent. of water, showed 30 per cent. insoluble.

It is evident that the solubility test is apt to mislead in several particulars. Intended to exclude inert "tar-oils," it excludes the valuable cresols as well. The presence of a large quantity of water, which may reach 20 per cent. or more without possible detection by the official tests, will correspondingly increase the solubility of the acid in water, vitiating the test completely.

A fractional distillation will, of course, give quite serviceable results in approximately indicating the quantities of phenol, cresols, xylenols and water present, and supersaturation with caustic soda solution and extraction with ether will serve as a rough estimation of bases and hydrocarbons. But these methods are too tedious and time-consuming for the use of the pharmacist, who is in need of methods requiring little time and attention.

Dr. Charles Rice, at whose request the writer took up this subject, suggested that Koppeschaar's bromine solution might possibly

be made serviceable here, with proper precaution, to show the proportions of the several phenols by their differences in bromine absorption. To determine with accuracy by this method the proportion of phenol and cresols in mixtures, the following conditions must be fulfilled: The mixture must be either free from all substances other than phenol and the cresols, or they must be present in known quantities and their weight deducted from the weight of the sample taken. The mixture must contain no other substances that bind bromine, or it must contain them in known quantity, in which case the amount of bromine they will take up must be known. The contaminating substances must not in any other way interfere with the reaction.

To make the method applicable to crude carbolic acid, ready means for determining the non-phenolic bodies present would be required, and it appeared from an examination of the literature on the subject, that simple and satisfactory methods for this purpose were available, but experience with them soon showed them to be wanting in accuracy.

For the estimation of water, it is usually directed to shake a known volume of the acid with a saturated solution of sodium chloride, on the assumption that the diminution in the volume of the acid, after agitation and perfect separation, is equivalent to the volume of water present. This the writer found far from being the case. A sample of acid, consisting of about equal parts of phenol and the cresols, and conforming to the pharmacopœial requirements, was, on distillation, found to contain about 0·5 per cent. of water. The same sample, on being shaken with an equal volume of the salt solution, should have decreased slightly in volume, but instead, it was found to *increase* 9·5 per cent., with a simultaneous separation of sodium chloride crystals. When sufficient water was added to the sample to make the mixture contain 5 per cent., and tested in the same manner, it increased 4 per cent. in volume. With 10 per cent. of water it decreased 6·5 per cent., showing two-thirds of the water present. With 19·5 per cent., a saturated solution of water in the acid at about 25° C., 15·5 per cent. was indicated. These results show the test to be entirely worthless for detecting or estimating moderate quantities of water, at least in samples containing much phenol. But the error is lessened as the proportion of water increases. Acids, consisting mainly of

cresols, give better results. A sample of this kind, from which 3·9 per cent. of water could be separated by distillation, gained 1·5 per cent. on shaking with salt solution. Saturated with water, so as to contain 12·3 per cent., it tested about 8 per cent. Similar results were obtained with commercial "crude cresol." A saturated solution of calcium chloride was tried at the suggestion of Professor Coblentz, but was found to have no advantage over the solution. Separation of the liquids after agitation was also slower, because of the greater density of the solution. Distillation seems to be the only practical method of estimating water, and even this cannot be said to be very exact, since the water that distils over contains considerable quantities of phenol, and the phenol, which comes over with the water and collects on the bottom of the receiver, no doubt contains water. There is also a small loss of water by vaporization.

Another difficulty lies in the estimation of non-phenols other than water. In Allen's "Commercial Organic Analysis," the following method is given for the rough estimation of "tar-oils": "Place 10 c.c. in a graduated tube, and gradually add 20 c.c. of a 9 per cent. solution of caustic soda (free from alumina). Close and agitate. Neutral oils form a layer above or below, after separating. To make separation more rapid and complete, add a known volume of petroleum spirit." In applying this method to three specimens of varying composition, the writer was unsuccessful. In each case the mixture of acid and soda was perfectly clear and the petroleum spirit, though acquiring a dark color, did not sensibly increase in volume. By extracting the alkaline mixtures with ether, the samples yielded respectively about 1, 4 and 5 per cent. of hydrocarbons, bases, etc., after spontaneous evaporation of the ether.

Muter and De Koningh (*Analyst*, Vol. 12, p. 191) estimate tar-oils by agitating 20 c.c. of the acid with 80 c.c. of 5 per cent. caustic soda solution and 5 to 10 c.c. of benzol. A dark layer which forms under the 100 c.c. mark represents the amount of tar-oils in the sample. This was tried with two samples known to contain at least 4 to 5 per cent. of tar-oils, but in neither case was a dark layer formed between the alkaline solution and the benzol. With one sample the benzol increased in volume, but an emulsion, at the zone of contact, which did not break up after twenty-four hours, made a reading impossible. With the other sample the benzol apparently

diminished in volume slightly, a small amount remaining permanently in suspension in the aqueous liquid, with a portion of the precipitated impurities from the acid.

Various changes in the details of both procedures were tried without success. It seems likely that at the time they were devised crude carbolic acid was quite different in composition from that now met with. The writer gives preference to the following expedient, but realizes that it is far from accurate, the results probably being always too low: mix 10 grammes (or 10 c.c.) of the sample with 50 c.c. of 5 per cent. caustic soda solution in a separator. Add to the mixture, after cooling to room temperature, 15 c.c. of ether, and shake actively for a few minutes, then put it aside to separate. Draw off the aqueous liquid and transfer the ethereal solution to a weighed porcelain dish. Extract the alkaline solution with two additional portions of 10 c.c. each, of ether, and add these to the contents of the dish. Allow the ether to evaporate spontaneously and weigh the residue, which represents the tar-oils in the sample. As nearly all of these are more or less volatile at ordinary temperatures, a considerable proportion of them is probably lost before all ether is vaporized, and since the amounts of the more volatile constituents vary, it is difficult to estimate this loss. In a warm and humid atmosphere, water condenses in the dish during evaporation of the ether, and additional time must be allowed in such cases for the evaporation of this water before weighing, which entails an additional loss of the oils. Under any circumstances the percentage of tar-oils obtained by this or other available means must be accepted with considerable reservation.

The uncertainty in the estimation of those constituents of crude carbolic acid not phenols, would render Koppeschaar's Bromine Method inapplicable to the determination of the ratio of phenol and cresols, even if there were no other objections, but there are two other reasons, which alone would be sufficient to reject it. One is the fact that crude carbolic acid nearly always contains still higher homologues of the phenol series than the cresols, each group of isomers combining with bromine in a different ratio. The other reason is that some of the impurities in the acid also form substitution compounds of bromine under the conditions of the assay, as the writer determined by experiment. The tar-oils obtained from two samples by extraction with ether were found in one case to require

6·7 c.c. of decinormal bromine solution for 0·1 gramme of oil, and in the other 6·4 c.c., which is approximately one-tenth as much bromine as is required by the same quantity of pure phenol. One of the samples yielded four times as much to ether as the other, and also in other respects showed great difference in composition; it therefore seems remarkable that there was no greater difference in the bromine absorption of the two ether extracts. It is, however, subject to too much variation to permit the adoption of a constant correction factor.

Two samples of crude carbolic acid were distilled and different fractions of the distillate examined separately. The results are given in the following tables:

SAMPLE I.

Fraction.	Distillate, per cent.	C.c. $\frac{N}{10}$ Bromine Solution required by 0·01 gramme.
98°–180°	1 { Water, 0·5 p. c. Phenol, etc., 0·5 p. c.	
180°–185° (mostly 183°–184°)	34	5·75 white, bulky precipitate.
185°–190°	46	5·6 " " "
190°–195°	13	5·35 brown-yellow, compact precipitate.
195°–200°	4	5·15 " " " "
Residue	2	4·65 " " "

The crude acid itself required 5·46 c.c. of decinormal bromine solution for 0·01 gramme of sample. Assuming the proportions of phenol and cresols to be about equal, as indicated by the boiling points, this would be equivalent to approximately 93 per cent. of total phenols. The hydrocarbons, bases, etc., extracted with ether, amounted to 1·05 per cent., and water, separated by distillation, 0·5 per cent. This still leaves 5·5 per cent. unaccounted for. Partial loss of the ether extract through volatilization does not explain this great discrepancy, but it seems probable that crude carbolic acid may contain a considerable quantity of other acids, which ether would not extract from an alkaline solution. Similar, and even greater, discrepancies were noticed in the examination of two other less pure samples.

SAMPLE II.

Fraction.	Distillate, per cent.	C.c. $\frac{N}{10}$ Bromine Solution required by 0·01 gramme.
95°–195°	3·6 { Water, 2·8 p. c. Phenols, etc., ·8 p.c	
195°–197·5°	51	5·15
197·5°–200°	25	4·8
200°–205°	14	4·5
Residue	6	3·8

The sample was labelled "crude cresol" and had a dark red-brown color. It required 4·68 c.c. of decinormal bromine solution, for 0·01 gramme, which is equivalent to 85 per cent. of cresols, applying the factor for cresols also to other phenols which may be present in small amount. The ether extract was 4·65 per cent. and the water separated by distillation 2·8 per cent., making a total of 92·5 per cent. The remainder is unaccounted for.

A third sample required 4·73 c.c. of the bromine solution for 0·01 gramme, corresponding to about 85 per cent. of cresols, etc. Distillation separated 4 per cent. of water and 4·2 per cent. was extracted from the alkaline mixture with ether. As only 1·5 per cent. of phenols passed over below 190° in distilling the water, it was concluded that the sample contained little or no phenol, as the latter boils at 182°, and the cresols between 190° and 200°. This sample also contains 7 per cent. of constituents, that are left undetermined for the present.

It was at first suspected that these discrepancies might have been caused by an error in the strength of the bromine solution. It was therefore re-standardized and found correct. After titration against carefully purified sodium thiosulphate, the solution was used in an assay of the purest phenol obtainable, indicating 98·9, 99·3 and 98·5 per cent. of phenol. The sample melted at 40·5°, the melting-point required for absolute phenol being 42·5°, and the result of assay thus being corroborated. Titration of the crude acids being performed under the same conditions, as nearly possible, insured accuracy of the results.

While it is not yet practicable to accurately determine the quantities of phenol and cresol in the complex mixtures containing them by the bromine method, this method is, nevertheless, in the

writer's judgment, better suited than any other single test, to indicate approximately the value of a sample of crude carbolic acid, and it furnishes information that cannot be obtained by the methods in general use, or by a fractional distillation. It may also be safely assumed that its results will be less liable to wrong interpretation. The bromine consumed by a definite amount of the sample and the character of the precipitate formed will give a very fair indication of quality and strength. Tri-brom-phenol separates in the assay as a very voluminous, white, flocculent precipitate, leaving the solution perfectly clear. The tri-brom-cresols separate imperfectly, a large proportion remaining suspended, forming a liquid of milky appearance. A portion of the precipitate settles to the bottom in form of small brownish-yellow globules, which occupy very little space as compared with the precipitate from the same quantity of phenol. It is easy thus to determine whether a sample in hand consists mainly of cresols or of phenol, without determining the boiling-points. After making control-experiments with mixtures of known quantities of phenol and cresol, it is possible to estimate approximately their relative quantities in samples of unknown composition. It was found, however, that the appearance of the precipitate of the one substance is but little changed by the presence of the other in quantities less than-fourth.

As the Pharmacopœia places no restriction on the proportions of phenol and the cresols, but merely requires the absence of more than 10 per cent. of the "less soluble constituents of coal tar," it may be assumed that a standard of not less than 90 per cent. of the phenol series was intended, irrespective of the relative quantities of these. The possible presence of large quantities of water was evidently lost sight of, and as this may be legitimately present up to 5 per cent., it would seem that a further allowance to that extent should be made in interpreting the pharmacopœial intentions, making a requirement of at least 85 per cent. of phenols. The quantity of volumetric bromine solution required for a given weight of an 85 per cent. acid must necessarily vary with the proportions of the different phenols, as their combining weights for bromine differ, and it is therefore hardly practicable to set an arbitrary limit of the volume of decinormal bromine solution that a definite weight of an 85 per cent. acid shall require. It will be necessary to judge from the character of the precipitate the approximate ratio of phenol and

cresols and calculate from the volume of bromine solution consumed their approximate percentages.

The writer recommends to proceed in the assay as follows: Place 1 gramme of the sample into a graduated 100 c.c. flask, nearly fill with water and shake briskly for a few minutes. Then fill to the mark with water and mix thoroughly. Measure 2 c.c. (= 0·02 gramme of the sample) into a glass-stoppered 100 c.c. flask, excluding undissolved matter, by filtration, if necessary. Add 10 c.c. of water, 12 c.c. of decinormal bromine solution and 2 c.c. of hydrochloric acid. Stopper at once securely and shake the mixture occasionally during a half hour. Then add 2 c.c. ot potassium iodide test-solution in such a manner as to avoid loss of bromine vapor and quickly re-insert the stopper. Shake thoroughly and add decinormal thiosulphate solution until the solution is decolorized. If the sample contains cresols in considerable quantity, the solution will become yellow again after standing a short time, probably due to the gradual breaking up of an addition-product of tri-brom-cresol and bromine or iodine. This may be hastened by active shaking after each addition of thiosulphate to the decolorizing point, and must be continued until the solution remains colorless after prolonged shaking. The number of cubic centimeters required, deducted from 12, gives the number of cubic centimeters of decinormal bromine solution consumed by 0·02 gramme of the sample.

The following short table will assist in calculating the result of the titration. It gives the volume of decinormal bromine solution required for 0·02 gramme of samples containing 85 per cent. of phenol and cresols, in different ratios, and 10 per cent. of tar-oils, the bromine absorbed by these being included:

Chiefly phenol	11·0 c.c.
Phenol, ¾; cresol, ¼	10·65 "
" ½; " ½	10·3 "
" ¼; " ¾	9·95 "
Chiefly cresol	9·6 "

The quantity of the still higer homologues of the phenols likely to be present is usually too small to make it necessary to consider them in the calculations for such rough estimations.

An example will best illustrate the calculation of results. The appearance of the precipitate indicates phenol and cresols to be present in about equal quantities, and 10·7 c.c. of decinormal bromine

solution is required. According to the table, an 85 per cent. acid would have required 10.3 c.c., so a simple proportion is all that is required.

$$10{\cdot}3 : 10{\cdot}7 :: 85 : x ; x = 88 \text{ per cent.}$$

This quantitative bromine test as a substitute for the present pharmacopœial solubility test, and the test for alkali are all that is required to arrive at the value of a sample for disinfecting purposes. No other information of any value can be obtained short of a fractional distillation.

PHARMACEUTICAL LABORATORY OF THE
NEW YORK COLLEGE OF PHARMACY, June, 1898.

STRUCTURE OF GELSEMIUM.

BY JOSEPH D. SEIBERLING, P.D.

The structure, and more especially the chemistry, of gelsemium have been frequently investigated. There are still a number of points in the development history, as well as morphology, of this important drug that require consideration. In order to be clear on the portions studied, whole rhizome, overground stem and root, Prof. Kraemer suggested that living specimens be procured. These were obtained from the nurseries of Mr. Meehan, Germantown, and Mr. Lamb, Fayetteville, N. C.

Gelsemium sempervirens, (L.) Pers. (also known as *G. nitidum*, Mx. and *Bignonia sempervirens*, L.) is a woody climber, growing in woods or thickets of the Southern United States and extending along the seaboard into Texas, Mexico and Guatemala. The underground stem is hardy, woody and of varying length. The overground stem is slender and purplish, climbing to a height of 15 to 20 feet or more. The leaves are perennial, lanceolate, short petioled, entire, and opppsite. The flowers are large, in opposite axillary clusters, mostly solitary, although varying from one to six flowered. The calyx is short, consisting of five lobes. The corolla is large, funnel-shaped, bright yellow. Stamens are five in number and inserted upon the base of the corolla tube. "Stigmas in one form, short and anthers exserted; in the other form, longer and anthers included." The fruit is a dry capsule, of a brown color and dehisces septicidally

into two boat-shaped valves. Seeds several, rather large, flat with a broad wing at the summit.

Gelsemium flowers in April, and is popularly known as Yellow Jessamine; also called Evening Trumpet flower and Carolina Wild Woodbine. The odor of the flowers is very sweet, and they are highly poisonous. Mr. Lamb, in a letter to the author, writes of the death of a daughter of the late Dr. Dick, from eating the flowers. In the

FIG. 1.—The left-hand illustration shows a portion of the rhizome and roots of *Gelsemium sempervirens* (L.), Pers., with a part of the overground stem. To the right is a portion of a large rhizome with roots.

Norfolk (Va.) *Herald* is recorded the death of a child four years old from eating the flowers of this plant; death ensued an hour after signs of illness were manifest.

Jesse G. Shoemaker (AMER. JOUR. PHARM., 1884, p. 130) has contributed an article on the histology of gelsemium, in which stress is laid on the development of the medullary rays as being characteristic in distinguishing roots and stems. The author does not find this to

be a diagnostic feature. Mr. Shoemaker gives as a second character "the tendency of the pith of the stem to be penetrated by several plates of large, thin-walled cells, which divide the pith more or less perfectly into four portions." This layer of cells is an internal phloem, similar to what we find in Solanum Dulcamara and many other plants, and which has been first accurately described in gelsemium by Miss Caroline Thompson (*Bot. Gaz.*, 1898, p. 118). This internal sieve zone is characteristic for the rhizome and overground stem of gelsemium, distinguishing them from the root.

L. E. Sayre (*Amer. Jour. Pharm.*, 1898, p. 11) gives the characteristic differences in structure between the overground stem and

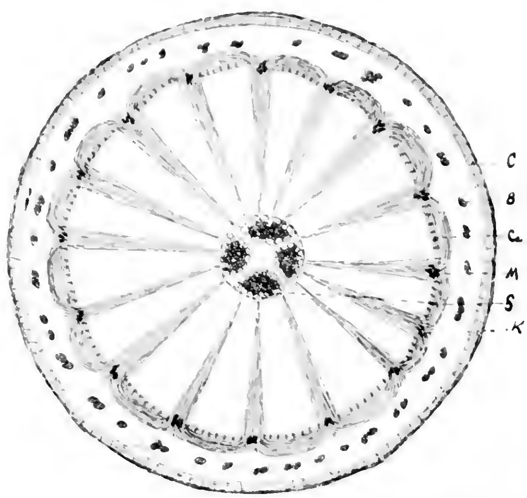

FIG. 2.—Diagram of overground stem of *Gelsemium sempervirens* (L.) Pers. *C*, cork; *B*, bast fibres; *Ca*, cambium; *M*, medullary rays; *K*, crystals of calcium oxalate; *S*, internal phloem.

rhizome to be, that "in the stem are found comparatively large bundles of bast near the wood, just outside the cambium. In the rhizome the bast is arranged near the axillary layer, and in an interrupted ring rather than in bundles." These differences in structure the writer, however, does not find to hold. The position and distribution of the bast fibers in the rhizome and overground stem of gelsemium are about the same. It is possible that in number the bast fibers in the rhizome may exceed those of the overground stems, still this cannot be said to constitute a difference to be relied upon. I will describe the morphology of the rhizome, overground stem and root of the living material that I examined.

OVERGROUND STEM.

The overground stem is that of a woody climber (*Fig. 1*). It is slender, on an average about ½ inch in diameter. Externally it is nearly smooth, marked by longitudinal wrinkles; internally (*Fig. 2*) it is whitish, marked with a pinhole cavity in the center. The epidermis is, in older plants, replaced by a thin layer of cork, from four to six cells thick. Beneath this there are a number of rows of collenchyma cells containing chlorophyll. In the parenchyma cells, lying beneath the latter, are found numerous starch grains, oil globules and large tetragonal or coffin-shaped crystals of calcium oxalate. The latter are found principally in the cells at the terminus of the

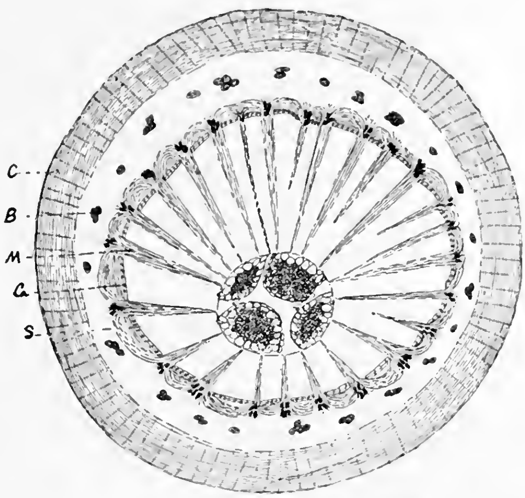

FIG. 3.—Diagram of rhizome of *Gelsemium sempervirens* (L.), Pers. *C*, cork; *B*, bast fibres; *M*, medullary rays, at the periphery of which are crystals of calcium oxalate; *Ca*, cambium; *S*, internal phloem.

medullary ray cells of the inner bark. The bast fibers are very long and silky, and arranged in an interrupted circle through the bark. Medullary rays are strongly lignified, provided with simple pores, are very regularly arranged, widening from within out, being about eight cells in width at the periphery. In the younger plants the internal phloem is not divided, while in the older ones it is divided into four parts, being situated central.

RHIZOME.

The rhizome creeps very near to the surface (*Fig. 1*). It is externally of a brownish-yellow, and internally (*Fig. 3*) of a yellow color. The cork is about eighteen to twenty cells thick. Underneath this

cork the parenchyma cells are large, and contain numerous starch grains and oil globules. The collenchyma cells of the overground stems with their chlorophyll contents are wanting here. In the medullary ray cells of the inner bark are found crystals of calcium oxalate. The latter are similar in size, shape and position to those found in the overground stem. The bast fibres are long, silky, and a little more numerous than in the overground stem. Medullary ray cells are about of the same shape, number and composition as those of the overground stem. The internal phloem, in older plants, is pronounced, divided into four well-marked zones, as in the overground stem. It is similar to that in the overground stem in every respect save position, it being eccentric rather than central.

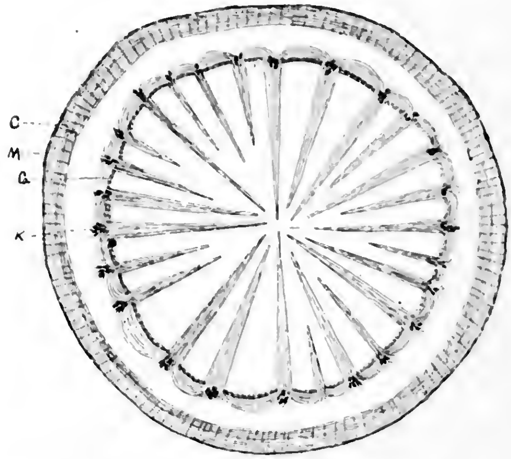

FIG. 4.—Diagram of root of *Gelsemium sempervirens* (L.), Pers. *C*, cork; *M*, medullary rays; *Ca*, cambium; *K*, crystals of calcium oxalate.

THE ROOT.

The root is quite long and spreading. It is externally of a dirty brownish-yellow, and internally (*Fig. 4*) of a yellow color. The thin epidermis in young roots is replaced by a thick layer of cork in the older plants, consisting of from sixteen to eighteen rows of cells. The collenchyma of the stem is wanting. Starch grains and oil globules are distributed throughout the parenchyma of the bark, as it is in the overground stem and rhizome. Similar crystals of calcium oxalate as already described are found in the medullary ray cells of the inner bark. The medullary rays are similar to those described in the overground stem and rhizome, but we find more secondary medullary rays.

To recapitulate:

Rhizome.	*Overground Stem.*	*Root.*
Cork 18 to 20 cells.	Cork 4 to 6 cells.	Cork 16 to 18 cells.
Collenchyma wanting.	Collenchyma, 4 to 7 cells, containing chlorophyll.	Collenchyma wanting.
Parenchyma, containing oil, starch and crystals calcium oxalate.	Parenchyma, containing starch, oil and crystals calcium oxalate.	Parenchyma, containing starch, oil and crystals calcium oxalate.
Bast fibres.	Bast fibres.	Bast fibres wanting.
Cambium.	Cambium.	Cambium.
Medullary rays.	Medullary rays.	Medullary rays.
Ducts and libriform tissue.	Ducts and libriform tissue.	Ducts and libriform tissue.
Internal phloem.	Internal phloem.	Internal phloem wanting.
Hollow center eccentric.	Hollow center central.	No hollow, but elements of primary fibro-vascular bundle in centre.

From this investigation certain new features have come to light regarding the structure of the rhizome, overground stem and root of gelsemium. Prof. Kraemer is of the opinion, from observations made, that all future investigations of the drug, to be of any value, must be made in the home of the plant. Even hothouse material is not sufficient to determine the morphological differences in these various plant portions with which we have to deal.

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NOTE ON SAFFRON.*

By Henry Kraemer.

There have been at least three rather detailed and comprehensive publications on saffron—the determination of its purity, substitutes and adulterations. One of the first of these was by Prof. John M. Maisch,[1] who made a most comprehensive report on the saffron of the American market in 1885. In 1892 E. Vinassa[2] gave a most valuable and important contribution to the *Archiv der Pharmacie*, on true saffron and its possible adulterations; and a year later, A. Tschirch[3], in his *Anatomischer Atlas* described and illustrated the important features in the study of saffron with his characteristic force.

Any one who is familiar with the literature on the subject is struck with the large number of vegetable, mineral and animal substances that have been used, as also dyestuffs that have been employed to adulterate the commercial saffron. There has been present, as there is still to-day, the style, stamens[8] and corolla of true Crocus (viz. *Crocus sativus*). There has also been found the flowers of Calendula,[2] Carthamus,[2] Arnica,[2] a flower of N. O. Caryophyllaceæ,[24] and corn;[2] the fruit of paprika;[21] onion scales;[21] wood of santalum rubrum,[28] and hæmatoxylon; fibres of meat;[1, 27] tissues of a sedge;[14] tissues of a cane,[26] wheat flour,[13] glycerin, honey, oil,[25] starch,[13] and mineral substances (principally barium and calcium[7] salts), as also soluble ammonium and sodium salts have been employed.[6, 20] The number of coloring principles[2] that have been used or suspected are at least 18 in number, used either alone or in mixtures,[30] including: acid fuchsin,[24] auramin, *brilliant yellow*, benzo-orange, chrysoidin nitrate, chinolin yellow, chrysophenin, coloring of cochineal,[26] curcumin, *dinitro para-kresol*, dinitro cresolate of sodium;[29] *Jaune vermicelle de Paris*, *Martin's yellow* (dinitro napthol),[30] *Metanil yellow*, *orange No. II*, Ponceau 2 R, picric acid, nitrate of chrysoidin, tropæolin OOO No. 2,[30] etc. Some of these are toxic in their action, chiefly those given in italics.

The ingeniousness displayed in the adulterations practised is remarkable indeed. In one instance Morpurgo[4] records the presence of barium sulphate, not only upon the outside of the drug, but also

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*Given in Abstract before the Pennsylvania Pharmaceutical Association, June, 1898.

in the cells of the plant. The inference was that a barium salt was first employed, and that afterward a soluble sulphate was used, so that the insoluble barium was precipitated and crystallized in the tissues.

It has been kept in damp cellars[18] in order to increase the amount of water in the drug. The coloring principle has been removed from the saffron, and the exhausted drug artificially colored.[22] The amount of ash found in commercial saffron has been 25 to 30 per cent. (Hart);[5] 26 per cent. (Adrian)[6]; 36 per cent. (*P. J. Trans.*, 1897, p. 223, 257), and 52·7 per cent. (Beringer).[7]

This sums up probably very briefly the extent of the ingenuity that has been employed to dishonestly make money out of the sale of the drug. But it cannot be said that the drug on the American market is so extensively adulterated as the literature would seem to indicate. The extended use of the microscope and of chemical reagents, probably as much as anything else, has made it possible that this, as many other drugs, is not so liable to adulteration.

Under the name of saffron can be purchased in this country chiefly but two products, the one being the stigmas with some styles and also fragments of anthers and perianth of *Crocus sativus*, L., and the other the tubular and perfect flowers of *Carthamus tinctorius*, L. The difference in price between the two being as 1 : 40 or 1 : 42, there is in some localities a tendency to substitute the one for the other. This substitution appears in very many cases to result from ignorance. In no case where crocus has been purchased or otherwise secured has there been found any flagrant case of adulteration. The saffron on the market appears to be either *Alicante*, containing more styles, stamens and fragments of corolla, or *Valencia*, consisting almost entirely of stigmas. There is also the American saffron, the product of *Carthamus tinctorius*. There appears to be but little tendency in this country to adulterate saffron with any of the mineral substances. The statement made by the *Ber. d. D. Pharm. Ges.*, 1898, p. 27, that some thousands of kilogrammes of flowers of calendula are shipped from China to America, and that they are not used as dyestuff, but employed in medicine, is worthy some attention. It is possible that this form of adulteration is still practised in some sections of this country—the calendula being either colored and used *per se* or

otherwise.* Much has been written on the subject of saffron regarding the testing of its purity, detection of substitutions, etc. The addition of foreign, inorganic substances is detected by the U.S.P. by incinerating dry saffron and determining the amount of ash. Recently, F. Ranwez[8] has employed radiography to good effect in some quantitative determinations of barium sulphate in saffron. As to what is the minimum amount of non-fusible ash that good saffron should yield has not been determined satisfactorily. Hart obtained 5·12 per cent.;[5] Adrian, 7·14 per cent.;[6] Barclay, 6·32 per cent.[9] in dry saffron. The difference is due in all probability to the fact that the amount of water in the drug examined by these several investigators varied. The results of Kuntze and Hilger[10] are probably of greatest value in this mode of examination: They find that pure saffron should not yield more than 8 per cent. of ash, of which 13·53 per cent. contains phosphoric acid, whilst the ash of safflower contains only about 2 per cent., and that of the flowers of calendula, 0·73 per cent.

A microscopical and micro-chemical examination of saffron on the market is sufficient to determine the character of the product. The sample under examination is either softened in water or in a steam oven and examined preferably with a compound microscope. The most striking thing is the total difference in the nature and structure of the parts. On comparing crocus with the American saffron and the possible adulterant or substitute calendula, we find the following characteristic points of difference.

I. *Crocus* consists of single cornucopia-like stigmas, or, at the most, of three united to a stem (the style). On examining the larger end of the stigma we find that it is fringed with little hairs (papillæ); in among the latter are few or many (although sometimes wanting entirely in individual stigmas) pollen grains. These pollen grains average about 40 to 45 mikrons in diameter. They have a surface that is nearly smooth, and are beset with numerous fine prickles. Some of these grains have germinated and show pollen tubes of various lengths.

II. *Carthamus* consists of the characteristic tubular flowers of the N. O. Compositæ. The flowers are perfect and the corolla tube is

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* Since writing this article, Professor True shows (*Pharm. Rev.*, 1898, p. 258) that the saffron of the West contains calendula florets and some are loaded with inorganic substances.

quite long (about 20 to 25 millimeters in length), consequently many of the flowers are broken in one or more pieces. The corolla tube is yellowish or almost colorless. The upper portion is divided into five lobes, which are bright red, and in the dry drug partially surround the anthers. From above these lobes, if the flowers are ripe, project the five stamens, united by means of their anthers (syngenesious). The pollen grains are very numerous compared to crocus, and are somewhat larger and of characteristic shape. The outer surface is extended into a prickly or spiny surface, and when the pollen grains are ripe they are seen to possess three prominent lid-shaped areas, through which the pollen tubes protrude.

On the inferior ovary is a style, which when ripe is longer than the corolla tube. The lower portion of the style is smooth, but above and at the surface of the bifid stigmas it is covered with long hairs. Among the latter are found some germinating pollen grains. Along each of the two fibro-vascular bundles extends a secretion vessel marked as a brown line.

III. *Calendula* consists chiefly of the ligulate corolla of *Calendula officinalis*, L. This is rather long and broad, varying from 15 to 20 millimeters x 5 millimeters. It possesses four prominent veins, and at the apex are four indentations. The epidermis cells of the upper surface resemble those of some other ray flowers of the Compositæ, viz., in that they contain yellowish oily drops. The outer surface of the corolla near the base possesses very peculiar and characteristic hairs. The ovary, style and stigma are not found abundantly in the drug. The style is much shorter than in Carthamus, the stigma is bifid and a *few pollen* grains are met which resemble those of Carthamus and other Compositæ, but are smaller than in Carthamus, measuring at the most 40 mikrons. When Calendula is used as a substitute or adulterant for Crocus, it is colored reddish by means of hæmatoxylin, safranin, fuchsin, etc.

The most striking and characteristic test distinguishing crocus from its substitutes and adulterants is the use of concentrated sulphuric acid. The test may be made on a microscopic slide or in watch-crystal or in a test-tube. The greatest care must be exercised that the glass is clean and that the sulphuric acid is C.P. The acid is added to the saffron or substitute and the following are the characteristic color reactions brought out distinguishing crocus from carthamus and calendula:

Crocus.—The stigmas only become blue immediately, and in a half minute the solution becomes blue, gradually changing to a violet, and finally a deep wine-red color.

Carthamus.—The flowers turn yellow and the solution remains colorless for a few minutes. The latter changes to yellow, and finally, after a much longer time, however, assumes a color similar to crocus, viz., a deep wine-red color.

Calendula.—The flowers turn brown or blackish-brown, as though charred. The solution behaves otherwise much the same as Carthamus.

Of course, in case any of the coloring principles other than those in the drugs have been used, they are easily detected by the proper reagents, as KOH for hæmatoxylin, etc.

This sulphuric acid test was probably first utilized by Joh. Müller[12] for distinguishing true saffron. In a paper on the adulteration of saffron he calls attention to the fact that, on the addition of sulphuric acid to *Crocus sativus* the latter changes to indigo-blue, reddish-purple, and finally blackish-brown. Further, that the leaves of *Crocus vernus*, which is used to adulterate saffron, give a dark-green reaction with the same reagent.

Bouillon-Lagrange and Vogel (*Annales de Chim.*, lxxx, p. 188), as early as 1811, had shown the peculiar behavior of the coloring principle in saffron to H_2SO_4, HNO_3, as later confirmed by Henry (*Jour. de Pharm.*, 1821, p. 400), who says, in his essay on the coloring principle of saffron, "le chlore, les acides sufurique et nitrique se comportant avec elle comme MM. Bouillon-Lagrange et Vogel l'ont observé." Kayser's later researches[11] on the chemistry of saffron have added still further to our knowledge of the coloring principle which behaves towards sulphuric acid as already mentioned.

It seems to the writer that the pharmacopœial tests for saffron might be improved by adding a botanical distinguishing test, as well as the sulphuric-acid test, which is so very characteristic for crocus. Only cotton impregnated with iodine would give anything like the same reaction with sulphuric acid.

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Beetroot Cultivation in the United States.—The United States Department of Agriculture has recently issued a report, from which it appears that the production of sugar, which only amounted to 800 tons in 1886, has steadily increased since that period, and exceeded 40,000 tons in 1896. There are eight factories in the country, which are well supplied with all the necessary plant, and it is owing to the successive and rapid establishment of these factories that the national production rose from 2,800 tons in 1890, to 20,453 tons in 1893, and that it shows since 1894 an annual progression of 10,000 tons. If a comparison be drawn between the production of sugar and the consumption during the last ten years, a still more marked advance is evident. The consumption, which was 1,355,809 tons in 1886, gradually increased until it amounted to 1,960,086 tons in 1896, an increase of about 50 per cent., while the population has only increased by 20 per cent. at the most during the same period.—*Board of Trade Journal*, March, 1898.

CRUDE CAUSTIC SODA SOLD IN THE MARKET AS CAUSTIC POTASH.

BY CARL E. SMITH.

(Report from Research Committee D, Section II., of the Committee of Revision of the U. S. Pharmacopœia.)

In the course of an investigation into the quality of commercial crude caustic potash, the writer has recently examined five samples that proved to be nothing more nor less than caustic soda of varying degrees of purity. Dr. Charles Rice, who requested the writer to investigate this subject, obtained these samples from various sources through which the grocery trade is supplied. They appear to be representative of what is sold in New York City as potash to such consumers as are not supposed to test their purchases chemically. The potash present was no larger in amount than that which crude soda might naturally contain, and in some cases the quantities of chlorides and sulphates were extraordinarily large. As the two alkalies rather closely resemble each other physically, such a substitution may easily be overlooked, and, as some of these products present a very good appearance, pharmacists may sometimes be tempted to use potash obtained from such sources for the preparation of potassium bromide or iodide, soft soap, etc., without considering a previous chemical examination necessary. In some such cases the substitution may not even be detected during the process of manufacture, as in the case of soft soap.

The following table indicates the composition of the five samples, the potash calculated as sulphate, in accordance with a rule formulated by Fresenius:

	A.	B.	C.	D.	E.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Sodium hydrate	65·9	82·8	71·6	87·0	85·2
" carbonate	4·75	5·3	3·18	3·7	3·18
" chloride	17·0	7·45	4·2	2·6	5·5
" sulphate	1·57	2·04	9·25	2·8	2·3
" silicate	0·58	0·33	0·4	0·13	0·55
Potassium sulphate	2·4	0·58	4·35	0·73	0·38
Water	7·0	3·4	6·4	4·7	2·4
Insoluble matter	0·21	none	0·17	trace	trace

Soluble impurities, present only in minute quantities in some of the samples, as alumina and lime, are not taken account of in the table.

This is another instance which shows that the pharmacist should not rely merely on the appearance of his supplies of chemicals for their identity and quality, and again emphasizes the necessity of applying chemical tests, not only to detect intentional substitutions and adulterations, but also to discover such inadvertencies as may occur now and then, even in the most carefully conducted manufacturing and wholesale establishments. In most cases this can be done by very simple means.

Potassium and sodium compounds can be readily distinguished by means of the familiar flame-test. This requires simply a few inches of platinum wire, for which clean iron wire may be substituted, if necessary, and a non-luminous gas flame. A fragment of a pure potassium compound, taken upon a loop of platinum wire and held in a non-luminous flame, colors the latter a pure violet, without a tinge of yellow, which would indicate the presence of potassium. Sodium compounds color the flame intensely yellow. Crude potashes always contain small quantities of soda, but when it is not sufficient to cover entirely the violet of the potassium flame, it is not objectionable for purposes that do not require purified potash. When no violet is visible in the flame, the sample may still consist largely of potash or it may be principally soda, and, when viewed through a plate of blue glass, it can be seen whether potash is present in small or large quantity, by the intensity of color visible through the glass, through which the yellow does not penetrate. It must be kept in mind, however, that the intensity of the potassium flame varies, not only with the proportion of potash in the sample, but also with the quantity taken for the test and the heat of the flame.

Accurate quantitative estimations of potassium and sodium, in presence of each other, can be made only by methods requiring considerable time and attention, but sufficiently exact results for ordinary purposes may be obtained by methods that are at the command of the practicing pharmacist. The one based on the insolubility of potassium bitartrate in mixtures of alcohol and water is, perhaps, the most convenient and satisfactory, when great precision is not required. This is the method directed by the U.S.P. of 1890 for the determination of soda in potash. The sample, dissolved in a small

quantity of water, is accurrately neutralized with a concentrated solution of tartaric acid, with phenolphthalein as indicator. Litmus does not answer, as normal alkali tartrates are alkaline towards it. Exactly the same volume as was required for neutralization is then added to the solution to convert the tartrates into bitartrate of potassium, which is precipitated almost completely, owing to its sparing solubility, and bitartrate of sodium, which remains in solution. By the addition of alcohol the precipitation of potassium bitartrate is made complete. The precipitate is collected on a filter and washed with alcohol until a drop of the washings no longer reddens blue, or preferably neutral, litmus paper previously moistened with distilled water. The filtrate is titrated with decinormal potassium or sodium hydrate, each cubic centimeter corresponding to 0·004 gramme of sodium hydrate. The precipitate of potassium bitartrate on the filter is transferred to a beaker, water added, and then volumetric alkali until neutralized with phenolphthalein as indicator. Heating the mixture hastens solution of the bitartrate. Each cubic centimeter of normal alkali required indicates 0·056 gramme of potassium hydrate. If preferred, the precipitate may be dried and weighed, and the weight obtained multiplied by 0·3, which gives the potassium present in the sample as potassium hydrate.

The actual amount of caustic and carbonated alkali must be determined by titration with sulphuric or hydrochloric acid. The fact is frequently overlooked that in titrating caustic alkalies in presence of phenolphthalein in the cold, one-half of the carbonate present is also included and calculated as hydrate. This is due to the fact that the bicarbonates of potassium and sodium are neutral to phenolphthalein. When the solution is sufficiently dilute, practically no carbon dioxide will have escaped when the neutral point is reached and all carbonate will have been converted into bicarbonate, as shown by the following equations:

$$KOH + HCl = KCl + H_2O \text{ (neutral to phenolphthalein).}$$

$$K_2CO_3 + HCl = KCl + KHCO_3 \text{ `` `` ``}$$

If methyl orange be now added and the titration continued until the color changes, the bicarbonate will have been converted to chloride, thus:

$$KHCO_3 + HCl = KCl + CO_2 + H_2O \text{ (neutral to methyl orange).}$$

The quantities of hydrate and carbonate are then calculated in the following manner: If, for example, 15·5 c.c. of normal acid be required for the titration with phenolphthalein, and 0·35 c.c. in addition, to render the solution neutral to methyl orange, then 15·5 — 0·35 = 15·15 c.c. is the volume required for the hydrate and 0·35 × 2 = 0·7 c.c. for the carbonate in the sample, each cubic centimeter corresponding to 0·056 gramme of potassium hydrate or 0·069 gramme of potassium carbonate.

The objection has been made to this method of titrating mixtures of alkali hydrates and carbonates, that it is untrustworthy because of loss of carbon dioxide during the titration with phenolphthalein. This loss can readily be avoided, as the writer has determined, by diluting the solution to 250 c.c. for each gramme of sample, running in the volumetric acid slowly and stirring continuously and gently to the end of the titration.

Somewhat less care is required in this regard when an excess of barium chloride is added to the solution before titrating, to precipitate the carbonate present. In this case all of the volumetric solution required to render the solution neutral to phenolphthalein is calculated as hydrate. The precipitated carbonate may then be readily estimated by continuing the titration after addition of methyl orange, shaking thoroughly after each addition of acid. The barium chloride used must be neutral to both indicators used, and at least enough to precipitate all carbonate must be added.

Chloride is most conveniently estimated by supersaturating the sample with nitric acid, adding an excess of decinormal silver nitrate, and titrating the excess with decinormal sulphocyanate, with ferric alum as indicator. Each cubic centimeter of the silver solution is equivalent to 0·00354 gramme of chlorine, or 0·00744 gramme of potassium chloride.

Sulphate is determined gravimetrically as barium sulphate, whenever great accuracy is necessary, but very serviceable results may be obtained by titration with barium chloride. The normal solution of the U.S.P. of 1890, containing 122 grammes of pure crystallized salt per liter, may be used. The sample is dissolved in dilute hydrochloric acid, avoiding a large excess, which retards precipitation of barium sulphate. After heating the solution to near boiling, the barium chloride solution is added a drop at a time, shaking after each addition, so long as each drop can be seen to cause

a precipitate. Heating is then continued below boiling, until the precipitate settles, leaving the supernatant liquid clear. A drop of the solution is then added, the precipitate allowed to settle again, and this continued until no further precipitation takes place. If haste is necessary, a little of the supernatant solution, still containing some of the fine precipitate in suspension, may be poured out in two test tubes, a drop of barium solution added to one, and the difference in turbidity noted. If the precipitation is not complete, the contents of the tubes are returned and the procedure repeated as often as necessary. With a little practice, fairly correct results can in this way be obtained very quickly. Each cubic centimeter of normal barium chloride solution corresponds to 0·087 gramme of potassium sulphate.

To test potash for silica, the U.S P. of 1890 gives the following directions: "If 1 gramme be dissolved in 2 c.c. of water and added to 10 c.c. of alcohol, not more than a slight colorless precipitate should occur within ten minutes (limit of silicate)." The same solution is then directed to be tested for carbonate, as follows: "After boiling this alcoholic solution with 5 c.c. of lime water and filtering, not the slightest effervescence should take place on adding the filtrate to an excess of dilute hydrochloric acid." Any sample containing an appreciable amount of carbonate will give a precipitate when tested as above for silica, although it may be free from the latter, since alkali carbonates are insoluble in alcohol. Potassium carbonate sometimes precipitates in alcohol in a flocculent form, and may then be mistaken for silica. The test for silicate and that for carbonate are thus both vitiated, as the greater part of the carbonate is removed from the solution before testing for it, and the sample can hardly fail to stand this second test. It would be preferable to perform the limewater test for carbonate with an aqueous solution of the sample, or to test for it in the manner indicated in the preceding pages. The most reliable test for silica is probably the one based on the fact that it is rendered insoluble by evaporating to dryness with an excess of hydrochloric acid in a porcelain or platinum dish, and heating for a while at an elevated temperature. Upon cooling, then moistening the residue with strong hydrochloric acid, and, after letting stand a while dissolving in hot water, the silica remains undissolved. For quantitative estimations it is filtered out, washed, ignited and weighed.

The best crude caustic potash available in the New York market at present is not greatly inferior in quality and strength to the standard set by the Pharmacopœia for the purified article, as the subjoined analysis of a sample recently examined will show. It can be obtained in drums containing 10 pounds, or in any larger quantity desired. It is in the form of a yellowish-white, coarse, granular powder, and gives a nearly clear and colorless solution. The composition is as follows:

	Per cent.
Potassium hydrate	86·4
Sodium hydrate	1·8
Potassium carbonate	4·85
Potassium chloride	1·4
Potassium silicate	0·1
Water	5·55

A total absence of sulphate, as noted in this sample, is unusual in crude potash, and the chloride is seldom less than 2 per cent. Alumina and lime are practically absent.

The methods used in the examination of this sample and those discussed at the beginning of this paper, are essentially those recommended by Fresenius. Potassium was estimated by precipitation with platinum chloride, and in some cases the results were confirmed by weighing the mixed chlorides of potassium and sodium, and estimating the chlorine in the mixture. Further corroboration of the absence of more than small quantities of potassium in some of the samples was obtained by the failure of precipitation with an access of tartartic acid or with sodium cobaltic nitrite.

In this connection an experiment was made to determine the sensitiveness of the sodium cobaltic nitrite test. Pure potassium bicarbonate was supersaturated with acetic acid and diluted to definite volumes. On adding the test solution to a solution containing the equivalent of 0·3 per cent. of potassium hydrate, a turbidity began to appear in 1½ minutes. A 0·2 per cent. solution became faintly turbid in 4 minutes. Greater dilutions failed to react even after standing over night. To detect for instance, 2 per cent. of potash in a sample of soda, the test would have to be applied to a solution containing at least 10 per cent. of the sample. Very rough quantitative estimations of potash may be made by diluting a solution of the sample to the point at which a reaction is barely visible within 4 minutes and assuming this dilution to contain 0·2 per cent.

of potassium hydrate. Another way, suggested by Dr. Charles Rice, consists in precipitating the potassium cobaltic nitrite from a concentrated solution of the sample, collecting on counterpoised filters, drying and weighing, another sample, containing a known quantity of potassium being treated in exactly the same manner, and the weights of the two precipitates compared. A large excess of reagent is required to obtain a maximum precipitation, enough to give the supernatant solution a dark brown color. The precipitate is appreciably soluble in water and should therefore not be overwashed. Both samples should be washed with the same quantity of water. As the composition of the precipitate is somewhat variable and the conditions governing the variability have not been determined, sodium cobaltic nitrite cannot at present be used for accurate estimations of potassium.

PHARMACEUTICAL LABORATORY OF THE
NEW YORK COLLEGE OF PHARMACY, July, 1898.

THE CHEMISTRY OF ALOES.

BY ALFRED R. L. DOHME, PH.D.[1]

Aloes is the concentrated juice of the plants of the genus Aloe, principally the varieties Aloe Socotrina, Aloe ferox, Aloe plicatilis, Aloe vulgaris, Aloe Africana and Aloe Perryi. Strange to say, the much-talked-of and official Socotrine aloes does not grow on the island of Socotra, this variety being Aloe Perryi, named after our famous Commodore Perry, who observed it on the island in 1878. Commercially speaking, the varieties of aloes are Socotrine, Curaçoa, Barbadoes, Natal, Cape and Indian aloes. In England they prefer Barbadoes aloes; in Germany, Cape aloes, and in this country, Socotrine and Curaçoa aloes. A correct and reliable division and classification of the varieties of this important drug is as yet only a wished-for but not by any means realized fact. Much of the Socotrine aloes we buy, and, apparently knowing, label "True Socotrine Aloes," is a mixture containing various varieties, and no doubt largely Curaçoa aloes. As we all know, Socotrine aloes costs about 25 cents a pound, while Curaçoa aloes costs only about 3 cents a

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[1] Read at the meeting of the Maryland State Pharmaceutical Association at Blue Mountain House, Maryland, on June 23, 1898.

pound; and, as we also know, the pharmacist nearly always calls for and uses the former, thinking the latter a cheap, malodorous substitute. If any aloes can be called not malodorous, and if comparisons of malodor can be made by skilled pharmaceutical olfactory nerves, perhaps it is safe to say that Curaçoa aloes is the stronger in odor, although not as unpleasant as Cape aloes. Whether or not the famous saffron-like qualities of Socotrine aloes justify us in investing 22 cents a pound for the saffron aloes is, however, another question, and I would like to ask the many skilled pharmacists seated before me if they always prefer the saffron-flavored aloes because of its saffron or because it is official. If it could be shown that Curaçoa aloes or any other aloes is as efficient as its saffron-flavored sister, would they still stand by the U.S.P. and pay 22 cents tribute to the latter or to the saffron flavor? I certainly would not. Drugs have been but little studied, and our standards for the same are necessarily vague and indefinite. When, however, science has taken a drug in hand and given us standards, and thereby upset our former macroscopical and necessarily superficial criteria as to their relative value, should we not accept the results of her revelations and adopt the benefits thereof? We know that aloin is one of the active principles of aloes, and if not the only one, as I shall show, still the main one, and a principle that we all know perfectly well is uniformly efficient and gives us all the results of the drug. If we can show that Curaçoa aloes contains as much and frequently more aloin than Socotrine aloes, are we not reasonably certain that the one is as efficient and valuable as the other, for certainly the odor of the aloes has no influence on the lower bowel? I have made comparative assays of Socotrine, Curaçoa and Cape aloes, and have found that they contain approximately the following relative amounts of aloin: (M. P., 103° C.) Socotrine aloes, soft in monkey skins, 7½ per cent. average of 3 assays. (M. P., 110° C.) Curaçoa aloes, hard and livery and of a light chocolate color, 18·5 per cent. in 3 assays. (M. P., 107° C.) Cape aloes, hard, glassy and black in color, 4½ per cent. average 3 assays. Inasmuch as practically all the aloin in this country is made from Curaçoa aloes as it is in England from Barbadoes aloes, and we have all found that it is usually efficacious and produces the desired effects, we cannot but conclude in the face of the above assays that no reason exists, as far as we know, why we should not use Curaçoa aloes to the

exclusion of the Socotrine, especially as it costs only about one-eighth as much. So much for the commercial side of aloes. T. and H. Smith, in 1851, and Stenhouse, Flückiger, Tilden, E. Schmidt, Liebelt and Groenewald since have studied aloes as to the aloin obtained therefrom. The Smiths operated on Barbadoes aloes, and obtained what they called barbaloin, formula $C_{17}H_{18}O_7 + H_2O$. Flückiger, in 1871, decided that the aloin he and Histed obtained from Socotrine aloes was not, as Pareira had stated, identical with barbaloin, but was $C_{15}H_{16}O_7$. From these aloins, notably barbaloin, Tilden had obtained by the action of strong oxidizing agents such as potass. bichromate, alaxanthin or methyl-tetra-oxyanthraquinone, thus indicating that aloin was a derivative of anthraquinone. As we all know, aloes contains besides the aloin, quite a quantity of resin, which has, however, as yet not been investigated. Tschirch and his pupils at Bern have been these past four or five years investigating in order the various resins, beginning with tolu, benzoin, peru, etc. He has recently taken up the resin of aloes, and finds it to be like the other resins, an ester or organic salt, made up in case of Barbadoes aloes of cinnamic acid, and one of that peculiar and characteristic class of resin alcohols, which he finds in all resins and has named "resinotannols" and which he has named "aloresinotannol." It is a gray-brown powder of formula $C_{22}H_{26}O_6$, and contains two hydroxyl groups, as he obtained from it a di-benzoyl derivative. The resin of Cape aloes was similarly treated, and yielded the same aloresinotannol; but to demonstrate that the resin was different from that of Barbadoes aloes, he found that the acid in combination with it was not cinnamic but para-cumaric acid. The resin of Socotrine aloes has not been taken up as yet, but the aloin from the three aloes was next considered. Here some most unexpected valuable and interesting observations were made, and as the result of close observation of a certain color reaction of aloe, known as Borntraeger's test for aloes. It is this: aloes or aloes solutions, when treated with either benzin or benzene, yield to these solvents a yellow substance which turns cherry-red on the addition of ammonia. It was noticed that Cape, Barbadoes and Curaçoa aloes gave the reaction, while Natal and liquid or true Socotrine aloes did not. The color was not due to the aloin or to the resin, as both of these, when pure, did not give it, but to another substance which no one ever thought was contained in aloes, and

which was obtained from the latter, or from aloin obtained from the first three kinds of aloes just mentioned. It is emodin, the great laxative, to which rhubarb, senna, cascara, frangula, owe their laxative properties. It can be obtained from aloin by extracting this with ether, from which it will crystallize, and can be purified by sublimation. Hence the so-called Borntraeger's reaction for aloin is not, correctly speaking, a reaction for aloin but for emodin; aloin that has been deprived of emodin not giving the reaction. A test of the emodin obtained from Barbadoes aloes showed that in doses of half to one grain it possesses marked purgative properties, and in smaller doses quite marked laxative properties, and it was shown that this property is due to increased peristalsis of the intestine. It was further shown that solutions of pure aloin, when allowed to stand exposed to the air, develop in a very short time quantities of emodin which were isolated and analyzed. The same result can be obtained by heating aloin with a 1 per cent. solution of caustic potash. Whether the reaction is one of oxidation or of saponification has not yet been determined, but it is believed that the laxative properties of aloin are due to emodin, and that even if our aloin that has been deprived of all emodin is taken into the system the conversion of the same into emodin in its passage through the system is the cause of its laxative property. While this does not detract from the value of aloin, it much increases our interest in this substance, and accounts for the unusual efficacy and popularity of cascara sagrada, whose active principle, the glucoside purshianin, which it was my good fortune to be the first to isolate, does, as we know easily by saponification, split up into sugar and this same emodin. The result of this valuable contribution to pharmaceutical science of Professor Tschirch and his pupil, G. Pedersen, will be to stimulate the interest in emodin, and probably to give us a ready means of making it on a large scale. To sum up the points brought out in this paper: (1) That Curaçoa aloes is as efficient and, being much cheaper, should be used in preference to Socotrine aloes, the greater portion of which as sold to-day is made up anyway of Curaçoa aloes. (2) That the resin of aloes is an ester or organic salt, and varies according to the kind of aloes, and that the varying constituent is the acid, the alcoholic constituent being aloresinotannol and being the same in both Barbadoes and Cape aloes, the only two thus far ex-

amined. (3) That aloin contains emodin, to which its laxative property is probably due. (4) That many laxative drugs, such as senna, cascara sagrada, rhubarb, buckthorn bark, besides aloes, owe their laxative property to this substance emodin or some substance like it, derived from anthraquinone, and homologous or isomeric with it. Work is now in progress to show the exact relation of anthraquinone to our well-known laxatives.

ESTIMATION OF NITRITES: A CORRECTION.

In a paper that appeared in the June number of this Journal, the undersigned reported a method for the valuation of amyl nitrite and spirit of nitrous ether, which is a modification of a method proposed by B. Grützner for the estimation of nitrites in general, being at that time unaware of the fact that a similar adaptation had been published in 1897 by F. Dietze (*Südd. Apoth. Ztg.*, 1897, No. 35). In a recent number of that periodical, for a copy of which the writer is indebted to Dr. Dietze, in which he remonstrates against the failure to take notice of his work and the German literature on the subject. Inasmuch as Dietze's work was published in a journal that is evidently not always taken cognizance of by those periodicals that may be looked upon as the repositories of everything valuable in current literature, this charge is hardly justifiable. The writer has no desire to ignore the results of German investigators, and has always endeavored to give credit wherever it was due. It was thought justifiable to assume that all published work of any importance, bearing on pharmaceutical-chemical analysis, would be found in such standard periodicals as *Chem Centralblatt* or *Zeitschrift f. anal. Chemie*, in neither of which any reference to the subject in question was found.

The merit of first applying the principles involved in the method to the estimation of nitrites is Grützner's. To Dietze belongs the credit of having first adapted the method to the valuation of spirit of nitrous ether, and to E. Buettner (*Südd. Apoth. Ztg.*, 1897, No. 98) the credit of confirming its usefulness for that purpose. The undersigned presents the claim of having independently adapted Grützner's method to the estimation of ethyl and amyl nitrite, at a later date, and of furnishing the first conclusive proof of its accuracy and reliability. CARL E. SMITH.

NEW YORK, July 7, 1898.

GLEANINGS FROM THE MEDICAL JOURNALS.

By Clement B. Lowe, M.D.

At the Twenty-seventh Congress of the German Surgical Society, held at Berlin, April 13 to 16, 1898, Professor Kröwlein (Zurich) gave

THE RESULTS OF SERUM THERAPY IN DIPHTHERIA.

He demonstrated by his statistics that serum treatment is no longer in the stage of empiricism, but rests on a tangible foundation. He said that since the serum was introduced in 1894, he had used it on every case of diphtheria that came into the hospital.

The statistics of his clinic from 1880 to 1890 are:

Total number of diphtheria cases before introduction of serum	1,336
Total number of deaths	594
Percentage of deaths	39 p.c.
Total number of cases after introduction of serum	437
Total number of deaths	55
Percentage of deaths	12 p.c.
Number of cases operated on (tracheotomy, etc.) before serum	662
Number of deaths	432
Percentage of deaths	66 p.c
Number of cases operated on after introduction of serum	101
Number of deaths	36
Percentage of deaths	35 p.c.
Number of cases without operation before serum	674
Number of deaths	96
Percentage of deaths	14 p.c.
Number of cases without operation after introduction of serum	336
Number of deaths	19
Percentage of deaths	5 p.c.

The speaker called attention to several points: (1) The general decrease in mortality; (2) the decrease in the number of cases in which operation was necessary; (3) the decrease in mortality of the cases operated on. He thought he was able to notice improvement at once after treatment was begun, by a fall of the temperature, the loosening of the membrane, a decrease in the size of the involved glands, and the fact that the process extended no further. Cases of the extensive involvement of the mucous membrane of nose, mouth and larynx were never seen since 1894.—*Phila. Med. Jour.*, May 7, 1898.

THE MEDICAL SERVICE OF THE ARMY.

To each regiment there is allotted one surgeon and three assistant surgeons, one hospital steward and two assistants, and twelve

privates. This is not a very large number of care-takers, when one realizes that in times of peace there is, in most communities of the Eastern States, an average of about 500 unmenaced persons to one physician and a large number of nurses.

The plan, as at present outlined, is that the rear of each division of the army will be provided with dressing places for emergencies, to which those wounded would be immediately brought. Considerably farther in the rear there will be an ambulance station, where more detailed work of a surgical nature may be done. At a still greater distance from the field will be three hospitals corresponding to the three brigades composing that division. These field hospitals will naturally be tents, each capable of affording accommodations for 400 or more wounded. A large number of ambulances serve the purpose of transportation of the wounded from the front to the hospital. During action the medical staff takes as sheltered a position as possible in the rear of its own regiment, in order to better provide for the immediate wants of the wounded. It is intended that those surgeons who work directly behind the fighting line shall be provided with simple drugs for the relief of pain, shock, fainting, heat or exhaustion. They will also be provided with such surgical instruments as are required for minor operations.—*Boston Med. and Surg. Jour.*, May 12, 1898.

TO ABORT ERYSIPELAS.

Lobit uses a 10 per cent. iodoformed or iodoled collodion, with which he has cured twenty-five cases within three or four days.—*Lem. Med.*, March 30, 1898.

RADIOGRAPHY OF THE STOMACH.

By mixing bismutum subnitricum with the food and beverages, Roux and Balthazard have succeeded in watching the contractions and action of the stomach during digestion, with the fluoroscope, and taking a series of radiographs of the entire process in dogs. —*Deu. Med. Woch.*, April 7th, *from Arch. de Phys.*, x, p. 85.

SODIUM SACCHARINATE.

The above is claimed to be one of the best intestinal antiseptics to date, without secondary effects. One gramme once or twice a day will notably diminish the number of bacteria in the intestines,

especially the Bac. coli. Take in wafers or apenta water.—*Jour. Amer. Med. Assoc.*, May 21, 1898.

IMPORTANCE OF SUGAR AS A FOOD.

Chauveau recently demonstrated before the *Paris Académie des Sciences* that the general assumption in regard to the amount of calories produced by sugar is erroneous. Instead of the theoretic assertion that 3 grammes of sugar are equivalent to the nine calories produced by the consumption of 1 gramme of fat, only 0·756 gramme of sugar is required to produce this same amount of calories. He urged the repeal of duties which tend to restrict the use of sugar, contending that the people should be urged to use it more freely.—*Jour. Amer. Med. Assoc.*, May 21, 1898.

THE ANTI-EMETIC PROPERTIES OF ICELAND MOSS.

Deguy and Bricemarct (*Journal des Practiencs, annali di farmacoterapia e chimica*, April), in making use of a tincture of this drug on account of its nutrient, demulcent and bitter tonic properties in cases of gastric disturbance, find that it possesses marked anti-emetic properties. From 30 to 50 drops are administered in a little seltzer water. The drug does not seem to have any effect on hysterical vomiting, and the authors have not as yet had occasion to use it in the vomiting of pregnancy.—*Vide New York Med. Jour.*, May 21, 1898.

COMPULSORY VACCINATION.

While England (*Revue Medicale*, Quebec, May 4) is still disputing over Jenners' discovery, Japan has made not only primary vaccination but quinquennial vaccination compulsory, and ordains the exclusive use of aseptically prepared calf lymph.

HYDRASTIS CANADENSIS.

In the *Independance Medicale* for April 17th, M. Marini, of Bagdad, relates his experience with this drug in the treatment of hæmorrhage in case of hæmorrhoids, tuberculosis and dysentery, and states that he has obtained remarkable results. He also maintains that it is the preferable remedy in the hæmorrhages of fibromyoas, and that it is the best means of combating the hæmorrhages of pregnancy at any stage, provided that it is taken at sufficiently prolonged intervals; that is, 20 drops of the fluid extract every

three hours, or four times a day. He claims that it is a therapeutic substance which is very valuable in obstetric practice, and is certainly superior to ergot of rye; it does not present the inconveniences of the latter, and may be administered freely, either as a curative or as a prophylactic in the metrorrhagias in all stages of pregnancy, labor or delivery; and during the puerperium, it is also a much safer remedy in the hands of midwives than ergot of rye.—*N. Y. Med. Jour.*, May 21, 1898.

DIET FOR CONSUMPTIVES.

The following excerpts are taken from a lecture delivered by Prof. Reynold W. Wilcox, M.D.:

Gentlemen:—You have just had an opportunity of examining a number of cases of pulmonary tuberculosis. If I were asked, in patients of this particular class, what was the most important thing to be done, I would say "feed them." It is more important than climate. Feeding stands in the first place, but it presents more difficulties than perhaps any other phase of treatment. You may talk as much as you please about tuberculosis being an infectious disease; there is no doubt that any system of treatment which deals with tuberculosis as an infection, and which ignores the patient, is going to fail. That has been the fault with laboratory men, but it is a fault which they are fast correcting. The findings of the laboratory deal with the conditions of the disease; we, as physicians, cannot fail to consider the patient. Without going into the question of pulmonary antiseptics; without going into the questions in relation to the value of particular drugs in their direct action on the results of the activity of the tubercle bacilli, or upon the elimination of ptomains, we shall consider the question of prime importance, *i. e.*, the feeding of the patient.

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The true diet of a patient suffering from pulmonary tuberculosis, I believe, should consist of meats, starches and fats, with an excess of the last, and a certain amount of phosphates.

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Nothing discourages an old tuberculosis patient so much as to find that he is bathed in a cold, clammy perspiration. This can be done away with in a large proportion of cases. If you will waken the patient about 4 o'clock in the morning sufficiently to take a

glass of warm milk with a little alcohol in it, the sweating will be greatly reduced, and it will not have the same demoralizing effect upon him. In this way you get a little extra food into the patient, and at the same time prevent the prostration which is associated with this sweating.

The secret of feeding tuberculous patients is to give them light and nutritious food, and food which is easily digestible, feeding them "early and often."

The article, which should be read in its entirety, is contained in the *Medical News*, May 7, 1898.

RECENT LITERATURE RELATING TO PHARMACY.

THE LIQUEFACTION OF HYDROGEN AND HELIUM.

In a paper entitled "The Liquefaction of Air and Research at Low Temperatures" (*Proc. Chem. Soc.*, 1895, **11**, 221), an account was given by James Dewar, LL.D., F.R.S., of the history of the hydrogen problem and the result of the author's experiments to the end of the year 1895. The subject was again discussed in a lecture on "New Researches on Liquid Air" (*Proc. Roy. Inst.*, 1896, **15**, i, 144), and a sketch given of the apparatus employed for the production of a jet of hydrogen containing liquid. It was shown that such a jet could be used to cool substances below the temperature which could be reached by the use of liquid air, but all attempts to collect the liquid in vacuum vessels failed. The type of apparatus used in these experiments worked well, so it was resolved to construct a much larger liquid-air plant, and to combine with it circuits and arrangements for the liquefaction of hydrogen. This apparatus, admirably constructed by the engineers, Messrs. Lennox, Reynolds and Fyfe, took a year to build, and many months were occupied in testing and making preliminary trials. The many failures and defeats need not be detailed.

On May 10th, hydrogen was liquefied by allowing gas, cooled to — 205°, and under a pressure of 180 atmospheres, to escape continuously at the rate of from 10 to 15 cubic feet per minute from the nozzle of a coil of pipe in a double silvered vacuum vessel of special construction, surrounded with a space kept below — 200°. Liquid hydrogen commenced to drop from this vacuum vessel into another doubly isolated by being surrounded with a third. On this

occasion, 20 c.c. of liquid hydrogen were collected in about five minutes, and on May 12th 50 c.c. were obtained before the hydrogen jet froze up from the solidification of air in the pipes. The yield of liquid was about 1 per cent. of the gas. The hydrogen in the liquid condition is clear and colorless, showing no absorption spectrum, and the meniscus is as well defined as in the case of liquid air. The liquid must have relatively high refractive index and dispersion, and the density appears to be in excess of the theoretical value, 0·18 to 0·12, deduced respectively from the atomic volume of organic compounds, and from the limiting density found by Amagat for hydrogen gas under infinite compression. The author's experiments on the density of hydrogen in palladium gave a value 0·62 for the substance in combination, and it will be interesting to find the density of the actual liquid at its boiling point. Not having arrangements at hand to determine the boiling point, two experiments were made to prove the excessively low temperature of the boiling fluid. In the first place, a long piece of glass tubing, sealed at one end, but open to the air at the other, and cooled by immersing the closed end in liquid hydrogen, immediately filled, where it was cooled with solid air. The second experiment was made with a tube containing helium.

The *Bulletin* of the Cracow Academy for 1896 contains a paper by Professor Olszewski, entitled "A Research on the Liquefaction of Helium," in which he states that "as far as my experiments go, helium remains a permanent gas and apparently is much more difficult to liquefy than hydrogen." Helium, which has been extracted from Bath gas by the liquefaction method described last year (*Proc. Chem. Soc.*, 1897, **13**, 190), and sealed up in a bulb with a narrow tube attached, was placed in liquid hydrogen, and a distinct liquid was seen to condense. A similar experiment, made with the same helium tube in liquid air under exhaustion, instead of in liquid hydrogen, gave no visible condensation. It would thus appear, as already suggested by the author (*loc. cit.*), that there cannot be any great difference in the boiling points of helium and hydrogen. A fuller account of the work will appear in the *Transactions*.

All known gases have now been condensed into liquids which can be manipulated at their boiling points under atmospheric pressure in suitably arranged vacuum vessels. With hydrogen as a cooling agent, it will be possible to get within 20° or 30° of the

zero of absolute temperature, and its use will open up an entirely new field of scientific inquiry.

During the whole course of the low-temperature work carried out at the Royal Institution, the invaluable aid of Mr. Robert Lennox has been at the author's disposal, and it is not too much to say that, but for his engineering skill, manipulative ability and loyal perseverance, the present successful issue might have been indefinitely delayed. The author's thanks are also due to Mr. J. W. Heath for valuable assistance in the conduct of these experiments.

BISMUTH SUBNITRATE.

In an article on the composition and tests for bismuth subnitrate, Thoms (in *Ber. d. Deutsche Pharm. Ges.*, 1898, Heft 4) says that according to the amount of water employed, and the temperature at which the salt is precipitated, as also according to the temperature at which the preparation is dried, does it consist of the following products in varying proportions as $Bi(OH)(ONO_2)_2$,$BiO(ONO_2)$, $BiO(OH)$ and water. Thoms recommends the Pharmacopœia to direct that upon heating the salt to redness 100 parts should yield 79 to 80·5 parts of bismuth oxide. Further, if 2 grammes of the nitrate are mixed with a number of cubic centimeters of water in a 100 c.c. measuring flask, and treated with 10 c.c. of normal KOH solution for several minutes, and the flask then filled up to the 100 c.c. mark, 50 c.c. of the clear liquid should not require less than 2·1 c.c. normal hydrochloric acid (21 c.c. $\frac{n}{10}$ normal hydrochloric acid) or more than 2·4 c.c. normal hydrochloric acid (24 c.c. $\frac{n}{10}$ normal hydrochloric acid).

The author gives the following method for determining the amount of nitric acid contained in the salt. Into a 100 c.c. graduated flask is introduced 2 grammes of bismuth subnitrate; this is mixed with a few cubic centimeters of water and shaken. To this is then added 10 c.c. normal KOH solution, and the mixture shaken for about five minutes. The flask is then filled to the 100 c.c. mark with distilled water, well shaken and allowed to stand until the mixture has settled so that the supernatant liquid is clear, 50 c.c. of the latter is removed by means of a pipette, and titrated with normal hydrochloric acid, using phenolphthalein or litmus as an indicator.

The number found is subtracted from 5 and the result represents the number of cubic centimeters of normal KOH solution that were required to neutralize the nitric acid necessary to form 1 gramme of bismuth subnitrate. 1 c.c. of KOH expresses 1,000th part of the equivalent of $\frac{N_2O_5}{2} = \frac{108}{2} = 54$, *i. e.*, 0·054 gramme. This multiplied by 100 gives the per cent. of bismuth subnitrate.—*Apoth. Zeit.*, 1898, p. 318.

STARCH FERMENTS.

Wyatt Wingrave has made a comparative examination, both chemically and clinically, of a number of preparations of starch ferments easily obtainable. His attention was confined to the vegetable or diastatic ferments, which, he remarks, are easily obtained, stable, reliable in action and economical in price. The best-known samples are malt-diastase and taka-diastase. His conclusions may thus be briefly summarized: (1) That of the commercial starch or diastatic ferments taka-diastase is the most powerful and the most reliable, since it is more rapid in its action—*i. e.*, it will convert a larger amount (of starch) in a given time than will any other amylolytic ferment. (2) That taka-diastase seems to be less retarded in its digestive action by the presence of the organic acids (butyric, lactic, acetic), and also by tea, coffee and alcohol, than are saliva and the malt extracts. (3) That all mineral acids, such as hydrochloric, etc., quickly stop and permanently destroy all diastatic action if allowed sufficient time and if present in sufficient quantities. (4) That taka-diastase and malt-diastase have, like ptyalin, no action upon cellulose (uncooked starch).—*The Lancet*, 1898, No. 3897, p. 1251.

STROPHANTHIN AND STROPHANTHIDIN.

Thoms was the first to prepare pure strophanthin, and at the same time to show that the difficulty of previous authors in obtaining a pure product was due to the presence of cholin and trigonellin in the seeds of strophanthus. Several other authors, viz.: Kohn and Kulisch and Feist (*Ber. d. D. Chem. Ges.*, 1898, p. 534), have further contributed to our knowledge of these principles. Kohn and Kulisch have confirmed the results of Arnaud, who proposed the formula for strophanthin as being $C_{31}H_{48}O_{12}$. Feist, however, gives the formula for the same substance, when dried over sulphuric acid

or at 105°, as $C_{32}H_{18}O_{16}$. The glucosidal character of this principle was not confirmed by these authors.

Feist obtained the insoluble decomposition product of strophanthidin. This is a crystallizable, neutral body, insoluble in water and ether, and sparingly soluble in alcohol. The M. P. is 169°–170°; it decomposes at 176° with frothing; it crystallizes upon cooling, and melts then first at 232°. Strophanthidin has the formula $C_{26}H_{38}O_7 + 1\frac{1}{2} H_2O$, and gives off easily a molecule of water upon drying. According to Feist, strophanthidin is a benzol derivative.

CEARIN, A NEW OINTMENT BASE.

Issleib mentions a new base (*Ber. d. Deutsch. Pharm. Ges.*, 1898, p. 127), which is prepared from 1 part of white Carnauba wax and 4 parts of liquid paraffin. The two are melted together and stirred until cold. The cearin is of a snow-white color, soft and of a uniform consistency. According to the author, it is stable, and an efficient substitute for Ung. Paraffin. Ung. Potassi Iodidi may be prepared with this base without the use of sodium hyposulphite. Ung. Hydrargyri Rub. and Ung. Plumbi have been prepared with this base, and kept eight months without suffering any change. Cearin also has the property of taking up from 15 to 18 per cent. of water.

EXAMINATION OF INSECT POWDER.

Durrant (*Pharm. Post,* 1898, 16) proceeds as follows: About 6 grammes of the insect powder are placed in a glass cylinder of a capacity of 30 c.c., and moistened with ether (specific gravity 0·735). The flask is closed with a plug of absorbent cotton, and the mixture allowed to macerate for about thirty minutes. The ether is then poured off and the maceration process repeated four times. The powder is finally washed with ether, so that a volume of about 30 c.c. is obtained. This ethereal solution should be of a beautiful yellow color; if green, the powder is likely to have been adulterated. If there is an absence of a pronounced green color, the solution is distilled at a temperature not higher than 93°, and the residue weighed in a tared dish. This residue should not weigh less than 0·243 gramme. In the best insect powder, the weight of the residue is about 0·356 gramme, and possesses the characteristic odor of the flowers.—*Pharm. Zeit.*, 1898, p. 325.

EDITORIAL.

OCCURRENCE OF METHYL SALICYLATE IN THE VEGETABLE KINGDOM.

It has been thought that the finding of certain chemical constituents in several plants might have some systematic value. The presence of solanine in several species of Solanum might be considered as of having some diagnostic value in considering the plants belonging to this genus, just as strychnine[1] seems to be confined to the genus Strychnos, or, at the most, to the N. O. Loganiaceæ; quinine to cinchona, etc. The modern researches of the plant chemist would seem to indicate, however, that there is more uniformity in the products manufactured from different plants, and that while there may seem to be certain restrictions in some cases, in other cases there is no end to the distribution and manufacture of similar principles in plants rather widely separated. For instance, hydrocyanic acid, which was supposed to be confined to the sub-orders Amygdaleæ and Pomeæ of the N. O. Rosaceæ, is now found[2] in *Phaseolus lunatus*, L. (N. O. Leguminoseæ); *Passiflora quadrangulata*, L. (N. O. Passifloraceæ); *Colocasia gigantea*, Hook. fil. (N. O. Aroideæ); *Kairimia zeylanica* Arn. (N. O. Celastrineæ), and a species of *Cupania* (N. O. Sapindaceæ). It is also found, according to Peckolt, in the root of *Manihot utilissima*[3] (N. O. Euphorbiaceæ) and *Vicia*[3].

The results of the work of plant chemists recently would indicate possibly that methyl salicylate is likewise much more widely distributed in the plant kingdom than was supposed. The earliest reference to the occurrence of methyl salicylate is by Haase,[4] who distilled *Viola tricolor*, L., with water, and obtained an ethereal oil, lighter than water and possessing an odor of peach kernels (Pfirschkern). This investigation seems never to have been further confirmed save by Kraemer,[5] who found that upon rubbing younger portions (Sposs-spitzen) of *Viola tricolor*, L., *var. vulgaris*, Koch, and *V. tricolor*, L., *var. arvensis*, Murray, between the fingers, an odor of methyl salicylate was apparent. This subject still requires chemical investigation, although several authors have determined the presence of salicylic acid in Viola tricolor.

The first record, according to J. U. Lloyd,[6] of the therapeutic use of this oil is to be found in empirical medicine. "The following reprint from an anonymous writer,[7] establishes the subject more clearly, in that it gives a very fair description of oil of gaultheria, as well as making a statement to the effect that it is the same as sweet birch oil, and showing further that many different plants yield the same oil."

"Oil of *Gaultheria procumbens* is the heaviest essential oil of which we have any knowledge; for I have found it to be 1·17. This furnishes us with an easy mode of testing its purity. The wonderful success of Swaim's Panacea has brought this oil into great vogue with all venders of catholicons, panaceas and syrups of sarsaparilla. It appears to be a vegetable principle secreted in

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1 *Die Pflanzenstoffe*, p. 1281.

2 *Nederl. Tijdschr. voor Pharmacie*, p. 1; through *Pharm. Zeit.*, 1898, p. 304.

3 AMER. JOUR. PHARM., 1872, p. 455.

4 *Inaug.-Dissert. über Viola tricolor*, Erlangen, 1782.

5 *Inaug.-Dissert. über Viola tricolor*, Marburg, 1897.

6 *Pharm. Review*, 1898, p. 176.

7 AMER. JOUR. PHARM., 1831, p. 199.

plants very widely separated by their natural affinities. The *Betula lenta* or sweet birch, secretes it in the bark ; the *Polygala pauciflora* in its roots ; the *Spiræa ulmaria*, the *Spiræa lobata* and the *Gaultheria hispidula* in their roots and stalks."

According to Lloyd (*loc. cit.*), Dr. Jacob Bigelow[8] had, previous to this anonymous writer and three years prior to Pagenstecher's work,[9] described oil of wintergreen as occurring in the bark of *Betula lenta*, *Gaultheria procumbens*, *G. hispidula ;* also in *Spiræa ulmaria* and the root of *S. lobata*.

In *Schimmel's Bericht*[10] we find the following summary of the plants yielding methyl salicylate :

"Salicylate of methyl has recently been detected by E. Bourquelot[11] in the root of *Polygala vulgaris*, L., *P. depressa*, Wender., and *P. calcarea*, Schulz, as well as in the stalks of *Monotropa hypopitys*, L. Bourquelot considers it probable that, as is also the case with the bark of *Betula lenta*, the ester is not present in the above-mentioned plants in the free state, but is formed by the action of a ferment upon a body analogous to Procter's Gaultherin.

"Salicylate of methyl appears to occur rather frequently in the vegetable kingdom ; so far as we are aware, it has, up to the present, been found in :

Gaultheria procumbens, L. (flowers and leaves)	CAHOURS, 1843.
" *punctata*, Blume (" " ")	DE VRIJ, 1871.
" *leucocarpa* " (" " ")	
" *Leschenaultii*, D. C.[12] (ditto)	BROUGHTON, 1876.
Betula lenta, Willd. (bark)	PROCTER, 1844.
Polygala Senega, L. (root)	LANGBECK, 1881.
" *alba* (root)	REUTER, 1889.
" *vulgaris* (root)	BOURQUELOT, 1894.
" *depressa*, Wender. (root)	
" *calcarea*, F. Schulz (root)	
Monotropa hypopitys (stalk).	
Laurus Bzoi n (bark)	SCHIMMEL & CO., 1885.
Spiræa Ulmaria, L. (flowers)	SCHNEEGANS and GEROCK, 1892."

Ed. Kremers and Martha M. James[13] contribute an article on the occurrence of methyl salicylate, and pains have been taken to inquire into the plants referred to by the different authors. They state that "*Betula lenta*, L., supplies at least the large bulk of natural methyl salicylate of commerce." "That *Betula alba*, L., yields methyl salicylate apparently has not been proven." A distillation of the twigs of *Benzoin Benzoin* (L.), Coulter, collected in the fall did not yield the authors any methyl salicylate. The authors also bring together the literature showing that methyl salicylate has been obtained by various authors from the following plants : *Erythroxylon coca*, Lam., and *E. Bolivianum ;*[14] *Polygala Senega* L.,[15] *P. Senega*, L., *var. latifolia*, Torrey and

[8] *Amer. Med. Bot.*, II, p. 28, Boston, 1818.

[9] *Rep. f. d. Pharm.*, 1834, p. 337 ; see also Procter, AMER. JOUR. PHARM., 1842, p. 211.

[10] *Semi-Annual Report of Schimmel & Co.*, April, 1895, p. 73.

[11] *Comptes rendus*, CXIX, p. 802.

[12] "Probably identical with *G. punctata*, Blume."

[13] *Pharm. Review*, 1898, p. 100.

[14] *Schimmel's Report*, 1895 (Oct.), p. 50.

[15] Langbeck, in *Pharm. Zeit.*, 1881, p. 261.

Gray;[16] *P. Baldwinii*, Nutt;[17] *P. variabilis*, H. B. K. *albi flora*, D. C.;[15] *P. oleifera*, Heckel;[15] *P. javana*, D. C.;[15] *P. serpillacea*, Weihe (syn. *P. depressa*, Warden; probably *P. depressa*, Wenderoth, of Bourquelot[19]); *P. calcarea*, F. Schulz;[19] *P. vulgaris*, L. Under the genera Gaultheria is mentioned, besides *G. procumbens*, L., *G. fragrantissima*, Wall, (syn. *G. punctata*, Blume, and *G. Leschenaultii*, D. C., the supposition is advanced that *A. Leschenaultii* of Broughton [20] is identical with *G. fragrantissima*), *G. punctata*,[21] and *G. leucocarpa*, Blume.[22]

According to a still more recent investigator,[23] methyl salicylate is found in still other plants. Mention is made of this ester as occurring in a large number of plants of the following natural orders, Leguminoseæ, Sapindaceæ, Euphorbiaceæ, Aurantiaceæ, Bixineæ, Oleaceæ, Rubiaceæ and Polygalaceæ, as also proven to exist in the Jasmineæ, Cupuliferæ, Myrtaceæ, Rosaceæ, Tiliaceæ, Rhamneæ, Erythroxyleæ and Gramineæ. The most methyl salicylate was found in *Abrus precatoria*, which yielded 28 milligrammes per kilo, and the least was found in *Briedelia lanceolata* (N. O. Euphorbiaceæ), which yielded 1·36 per mille. Among the plants found to contain methyl salicylate were *Coffea liberica* and *C. arabica*.

The interest in these investigations is only beginning. The results will be of great value and interest to the botanist and chemist, as well as the pharmacist. The literature must be sifted, the observations confirmed and the peculiar conditions understood under which the formation of methyl salicylate is made possible before we can do more with the material at command. It is possible that when these observations are completed that they will be found to possess important systematic value, and have also a physiological significance in the study of plants.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

AN ILLUSTRATED FLORA OF THE NORTHERN UNITED STATES, CANADA AND THE BRITISH POSSESSIONS, from Newfoundland to the parallel of the southern boundary of Virginia, and from the Atlantic Ocean westward to the 102d meridian. By Nathaniel Lord Britton, Ph.D., and Hon. Addison Brown. Vol. III.

Volumes I and II have already been reviewed in the AMERICAN JOURNAL OF PHARMACY, November, 1896, p. 630, and August, 1897, p. 428. The concluding volume of this important contribution to American botany has just been issued. It treats twenty-eight families, from Apocynaceæ to Compositæ, in the sequence of Engler and Prantl. As this includes the more important and largely repre-

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[16] Reuter, in *Arch. der Pharm.*, CCXXVII, p. 309. See also Lloyd's paper in *Pharm. Rund.*, VII, p. 86; Karl Mohr, *ibid*, p. 191, and Maisch, *ibid*, p. 236.

[17] H. C. C. Maisch, in AMER. JOUR. PHARM., LXII, p. 484.

[18] Romburgh in *Schimmel's Report*, Oct., 1895, p. 50.

[19] *Comptes rendus*, CXIX, p. 802.

[20] J. Broughton, in *Pharm. Jour. Trans.* [3], XI, p. 281.

[21] *Berichte*, XII, p. 246.

[22] Koehler, *Comptes rendus*, CXIX, p. 802.

[23] *Nederl. Tijdschr. voor Pharm.*, p. 1, through *Pharm. Zeit.*, 1898, p. 304.

sented families of Gamopetalæ, the most difficult of our North American Phanerogams for determination, the appearance of Volume III has been awaited by the student of systematic botany, to decide many of the problems of determination that are continually puzzling the plant collector.

As in the former volumes, Dr. Britton has received the assistance of specialists in certain groups, as, for example, in the Solanaceæ the descriptions of the genus Physalis have been contributed by Mr. P. A. Ryberg. The recent determinations of special students have likewise been accepted, and, as a result, throughout the book there is a marked tendency to recognize as distinct species many recognized forms which the older botanists were prone to consider merely as varieties.

The intent to determine the exact limitations of families and genera is apparent, and as a result of this critical labor numerous changes are noted, as, for example, the asters of the Eastern United States are now classed under three genera—Aster, Doellingeria and Ionactis.

The stupendous labor of the authors is attested by the fact that, in less than two years, the three volumes have been published, describing and illustrating 4,162 distinct species, including all species now recognized as occurring in the territory covered.

The illustrations, in most cases, are good representations of the plants. The "dodders" serve as an example of their value. In some cases we wish that they had been more extensive. In such small illustrations as the character of the work necessitated, it is probably impossible to show both the characteristic basal and stem leaves of the asters, but as the involucral scales are described as distinguishing characters, they should be figured in *each* species. The omission of explanatory notes to the figures has been carried through the entire volumes.

Many of our old friends are dubbed with new binomials, and this will require an effort to know them by their new names. Some of these changes are interesting to pharmacists, as affecting the source of our Materia Medica and indicating the probable changes in the next revision of the Pharmacopœia. Spearmint is Mentha spicata L.; Dandelion is Taraxacum Taraxacum (L.), Karst.; "Beech Drops" is Leptamnium Virginianum (L.), Raf.; Fleabane is Leptilon Canadense (L.), Britt., and Culver's Root again becomes Leptandra Virginica (L.), Nutt. The Cypress vine of the garden becomes Quamoclit Quamoclit (L.), Britt, and the Kenilworth Ivy becomes Cymbalaria Cymbalaria (L.), Wettst, and the tomato is Lycopersicon Lycopersicon (L.), Karst. These are but samples of the changes in names.

The uses and economic value of the plants have received very little attention. In a few descriptions commonplace statements that "the leaves are used as salads," or "the root as a substitute for food" occur, but there is no attempt to make this a feature of the volume.

The almost entire absence of references to the medicinal value of plants is another weak spot in the work. The few statements made are of questionable value. On page 101 we are told that the mucilage of the seeds of Salvia Sclarea L. is used to "clear specks from the eye." On page 228 we are told that the "*flowers and fruit of Sambucus Canadensis have strong medicinal properties?*"

There is no mention whatever made of the medicinal value of such plants as

Viburnum opulus L., Viburnum prunifolium L., Valeriana officinalis L., Digitalis purpurea L., Verbascum Thapsus L., Lobelia inflata L., Eupatorium perfoliatum L., Inula Helenium L., Anthemis nobilis L., Matricaria Chamomilla L., Tanacetum vulgare, Artemisia Absinthium L., Tussilago farfara L., Arctium Lappa L., Leptandra Virginica, Nutt, Grindelia squarrosa (Pursh), Dunal., Hyoscyamus niger L., Datura Stramonium L., and a host of other drug-yielding plants. This is to be regretted, as this leading botanical work could readily have been made a valuable aid to the student of materia medica.

The appendix contains descriptions and figures of eighty-one plants, new discoveries or determinations made while the work was in press. It is noted that here the distinguishing characters are printed in italics, and it is regretted that the same plan was not adopted in the body of the work, as it would have been of great assistance in the determination of plants.

The key to the orders and families has been carefully elaborated, and will prove a valuable aid to collectors and students. The indices are complete, and in the English index Judge Brown has carefully compiled all the popular names, and this will add greatly to the interest of the work. Throughout Volume III more attention has been paid to popular or common names than in the preceding volumes. Foreign plants that have become adventitions in certain localities or escaped from cultivation have been introduced in the volume, and not a few of these are plants of medicinal value. In pointing out a few defects, we do not desire to detract from the deserved commendation of the work. The typograpical errors and errata are remarkably few. The style and character of this flora is such that it must serve as a type for future American works on systematic botany. G. M. B.

The Extra Pharmacopœia. Revised in accordance with the "British Pharmacopœia," 1898. By Wm. Martindale. Serotherapy, Organotherapy, Medical References and a Therapeutic Index by W. Wynn Westcott. Ninth edition. Pp. 626. London: H. K. Lewis. 1898.

About three years have elapsed since the publication of the eighth edition of "The Extra Pharmacopœia." The changes in the present edition are due to the publication of the new Pharmacopœia. In addition to this, however, we note the numerous details and references to the use of the newer unofficial remedies. Among these may be mentioned new synthetic compounds having local anæsthetic properties allied to cocaine—eucaine, holocaine and orthoform. The vaso-dilators, erythrol and manitol nitrates, as well as nitroglycerin (trinitrin) and amyl nitrite, have received attention by the authors according to the light of later researches. Compounds of silver, the citrate and lactate, argentol, argonin and protargol, have been introduced to medical practice and noticed in this new edition, as also the use of glycero-phosphoric acid as a nervine tonic; the new bismuth compounds, chlorodyne equivalents, iodoform succedanea, antipyretics and antiseptics for internal and external use. The last group includes chinosol, creosote and guaiacol compounds. The official groups of concentrated infusions, lozenges, pills, ointments and paraffins are also described and commented on. The controversies on hyoscine and scopolamine, and on pilocarpine and pilocarpidine are likewise referred to, as well as euphthalmine—a synthetic compound for producing mydriasis—and urotropine, a solvent of uric acid, designed to assist in its elimination. The work on antitoxins, serums and lymphs has been revised by noting the ex-

tended use of serotherapy and organotherapy, the diagnostic value of mallein and tuberculin, and the Widal test for typhoid fever, and also the use of serums and antitoxins as prophylactics against diphtheria and typhoid. The newer monographs on aloes, calcium compounds, chelidonium, digitalis, compounds of mercury and iron, mustard, opium, orange, rose, mescal buttons and other drugs have been noticed. The therapeutic index has been extended, and now includes a classified list of antidotes to various poisons.

The revolution in the official strength of alcohol is explained by two tables, which will be found of practical utility for the preparation of the "several degrees of dilution." Numerous medical references to medicinal agents have brought the Extra Pharmacopœia up to date. The well-merited reputation of this work for the conciseness of treatment of drugs and preparations and an up-to-date discussion of the same is sustained in the ninth edition. As we have already said (*Amer. Jour. Pharm.*, 1895, p. 338), "the book is a valuable one for reference, not only by those using the British Pharmacopœia, but by every one who prescribes or dispenses medicines."

A Laboratory Guide in Qualitative Chemical Analysis. By H. L. Wells. New York: John Wiley & Sons; London: Chapman & Hall. 1898.

This is a cloth-bound, octavo volume, intended for students who are to work under the supervision of an instructor. The contents are divided into three parts, to which are appended a list of apparatus and two sets of labels.

Part I covers seventy pages. It is devoted to directions for the detection of the positive inorganic radicals and the inorganic negative radicals. In these directions the author presents a method of instruction which he has developed in teaching the subject. This method consists in having the student apply reagents to labelled solutions of twenty-seven metals and seventeen acids, and in requiring him to determine for himself the results of the operations. An idea of the system may be gained from the following abstract of the directions given the student for the study of the qualitative behaviors of lead and of its detection in a solution containing soluble salts of lead, silver and mercurous mercury: Find, by experiment, which of the twenty-seven solutions of the metals gives precipitates when a few drops of hydrochloric acid are added. To learn the process of analysis, take separately in small beakers portions of the three solutions which give precipitates with hydrochloric acid, and in another beaker make a mixture of about the same quantity of these solutions. Label the beakers accurately, and in all subsequent operations take care that no mistakes in the identity of the substances are made. To each of the four solutions add hydrochloric acid, filter off the precipitates, wash them with boiling water, and to the filtrate from the mixed chlorides add dilute sulphuric acid. Find which of the metals has given the reaction by adding sulphuric acid in the same way to the filtrates from the separate chlorides. The recognition of silver and mercurous mercury is then directed to be undertaken in a similar manner.

By means of this method, the author aims to obviate thoughtless and mechanical work on the part of the student, and to develop in him the powers of observation, inductive reasoning and memory. The thirty pages of Part II explain the formation of formulas and equations, and some other points of theory which have a special bearing upon the course of study, including the subject of ionization.

Part III occupies fifty-two pages. It consists of an alphabetical arrangement

of the radicals, with brief descriptions of the properties upon which the analytical methods are based.

The point to be decided in regard to this book is whether it is adapted to the needs of a beginner in the study of qualitative analysis. We don't believe it is altogether so adapted; the plan of analysis, as given, is too cumbersome for a beginner, who should be given but one solution for analysis at a time. We think, however, this plan could be simplified for the student and the book be made to serve his purpose, by the instructor having him first analyze the mixture to ascertain its behaviors, and afterwards the separate solutions, one at a time, to enable the student to determine the substances causing these behaviors. The beginner's mind would then be freer to observe, not being haunted by the possibility of getting his materials mixed. But, even then, if we were to put this plan of analysis in his hands, with the object of developing in him the power of observation, we would withhold Part III, for the author has given in this section the very things he wants the student to observe for himself while working according to Part I. The average student would not be long in discovering that these things could be found here, even in the absence of the author's suggestion that he confirm his own observations by consulting this part of the book, and, having put the temptation before him, we would not be surprised to find this student turning leaves and reading instead of folding filters and plodding. J. C. P.

A SHORT COURSE IN INORGANIC QUALITATIVE ANALYSIS FOR ENGINEERING STUDENTS. By J. S. C. Wells, Ph.D., Instructor in Analytical Chemistry, Columbia University, New York: John Wiley & Sons. 1898. 12mo. x + 294 pp.

In preparing this work the author has followed the general plan of Fresenius, but with the idea, as he states, of presenting only that which seemed essential to a clear understanding of the subject and to make it as concise as possible. For this reason he has omitted all but the more important reactions of the different metals and acids, these also being limited in number to those more commonly considered.

The author is evidently impressed with the importance of the study of reactions, for not only are the individual reactions of the members of the different groups considered, but in the introduction to the book considerable space is devoted to this subject, and, in addition, the schemes for separation are accompanied by tables of scheme reactions, these latter making clear to the student the effect of each reagent added to a solution.

Altogether, the work seems well adapted for its purpose, and we believe that it will be found a valuable guide, not only to engineering students, but to others who wish to take a practical course in qualitative analysis but who have not the time to devote to a more elaborate study of the subject. F. Y.

ARBEITEN DER KOMMISSION DES DEUTSCHEN APOTHEKER—VEREINS ZUR BEARBEITUNG DES ARZNERBUCHES. In this work of the Committee on Revision of the German Pharmacopœia we find a number of alterations and additions suggested. Some changes in solubility in alcohol of ammoniac and benzoin are given. The characteristic nervature of folia stramonii is described. Then, also, additions or changes in the tests for acidum agaricinum, aloe, euphorbium, kali causticum fusum, santonin, sebum salicylatum, spiritus

æthereus, tinctura digitalis and zinc salts, etc. Under strophanthus the microchemical test with sulphuric acid is recommended.

Bulletin of the Department of Labor. No. 16, May, 1898. Edited by C. D. Wright and Oren W. Weaver, Washington, Government Printing Office.

The major portion of this number contains trustworthy information relating to the opportunities for remunerative employment of American labor and capital in the Yukon Valley and adjoining territory. A number of excellent maps accompany the report.

Recherches Chimiques sur les Quinquinas. par MM. Pelletier et Caventou: Lues à l'Académie des Sciences le 11 Septembre, 1820. Réimpression des Annales de Chimie et de Physique. T. 15 (1820), pp. 289.

This is a reprint, issued by Dr. J. E. De Vrij, of the chemical researches on quinine by Pelletier and Caventou, who gave to the world the results of their studies on this alkaloid, and to whom it is proposed to erect a monument in front of the École de Pharmacie de Paris.

Pharmaceutical Formulas. Collated chiefly from *The Chemist and Druggist* and "The Chemists' and Duggists' Diaries." By Peter MacEwan. Pp. 664. Price 8s., post free. London: *The Chemist and Druggist*, 42 Cannon Street.

This is a book of useful recipes for the drug trade, and comprises formulas for toilet preparations and specialties, preparations for the hair, dentifrices, perfumes, household and culinary requisites, antiseptics and disinfectants, inks, varnishes, confectionery, medicinal compounds, and many other preparations related to the art of pharmacy. "One feature of the book is that the contents are, in a great measure, based upon requests for more than a generation of pharmacists for assistance in supplying articles for which they could discover no recognized formulas." "The information so collated has been, as far as possible, checked by experiment and reference to the original sources and supplemented by private formulas which have been abundantly proved in practice." To provide for great differences in tastes, a great many different formulæ of the same preparation are given. The editor does not claim that all the formulæ will work under all conditions, but says this with regard to formula failures: "Many a man says a formula is bad when his ingredients are at fault. Weak lime-water does not emulsify like freshly-prepared aqua calcis; hard paraffin has not all the properties of beeswax, nor does a geranium-loaded otto of rose give the delightful aroma of the real thing. Such deviations may not always be the cause of failure, but they often have something to do with it, and manipulation has more." The formulas published in this work have been selected and in many cases tried. The information contained in this volume will more than repay the practical pharmacist in having it in his possession.

Untersuchung in der Zummtsäurereihe. By Hermann Kunz-Krause. Reprint from *Ber. d. D. Chem. Ges.*, xxxi, Heft. 8.

The author has investigated the appearance of fluorescence, which occurs by the action of metallic sodium on cumarole and some other derivatives of cumarin.

TRANSACTIONS OF THE ACADEMY OF SCIENCE OF ST. LOUIS. Reprints on the following topics have been received:

An Unusual Phyto-Benzoar By Wm. Trelease. (See AMER. JOUR. PHARM., 1898, p. 52.)

The Trees of St. Louis, as Influenced by the Tornado of 1896. By Hermann von Schrenk. The author enumerates some of the phenomena which followed the period of destruction of the tornado which swept over the southern part of St. Louis on May 27, 1896. "There was hardly a tree that escaped injury of one kind or another, with the possible exception of several cypresses, *Taxodium distichum*, which, with their conical forms, yielded to the force of the wind. The maples and elms, as stated by Norton, were in many cases uprooted, and when this took place in the first few moments of the greatest wind velocity the trees were simply turned over, and, when straightened up some days after, resumed their former growth, and to-day these trees are almost the only normal trees in the Lafayette Park district." The destruction of foliage was very marked, particularly in such trees as the soft maples and sycamores; several trees of the honey-locust retained most of their leaves. In specimens of maple and sycamore there was observed a double (abnormal) ring in the branches, but not in the trunk; corresponding to observations made by King.

ECOLOGICAL PLANT GEOGRAPHY OF KANSAS. By A. S. Hitchcock.

A CONTRIBUTION TO THE HERPETOLOGY OF MISSOURI. By Julius Hurter.

NEW OR LITTLE KNOWN NORTH AMERICAN BEES. By Charles Robertson.

THE MOLLUSCAN FAUNA OF WESTERN NEW YORK. By Frank Collins Baker.

THE EFFICIENCY OF GEARING UNDER FRICTION. By Calvin M. Woodward.

A METHOD OF MEASURING THE PRESSURE AT ANY POINT IN A STRUCTURE, DUE TO WIND BLOWING AGAINST THAT STRUCTURE. By Francis E. Nipher.

CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY. Reprint from *Proc. Acad. of Arts and Sciences*, May, 1898.

In this reprint is contained a valuable contribution, by B. L. Robinson, on (1) Revision of the North American and Mexican species of Mimosa, and (2) Revision of the North American species of Nepuntia. The work is wholly systematic.

BASIS OF THE SCIENCE OF POLITICAL ECONOMY. By Ed. Atkinson. Reprint from *Proc. Amer. Acad. Arts and Sci.*, March, 1898.

A TABLE OF ATOMIC WEIGHTS. By Theodore William Richards. Reprint from *Proc. Amer. Acad. Arts and Sciences*, May, 1898.

This is a continuation of the work on atomic weights from the chemical laboratory of Harvard College, and will be noted more fully at a later issue of this JOURNAL.

L'ORGANO-TERAPIA NELLE NEFRITI DELLA INFANZIA. Per il Prof. Luigi Concetti. Estratto dal *Bull. R. Acad. Med. di Roma*, 1897–98. Fasc. 1.

ROYAL BOTANIC GARDENS, TRINIDAD. Annual report for the year 1897, by J. H. Hart, Superintendent. Trinidad: Printed at the Government Printing Office, Port-of-Spain, 1898.

The report indicates progress in every line. A number of plants meriting distinct specific rank have been discovered. Among others, a large illustration of the new African coffee (*Coffea stenophylla*, G. Don) is given. The trees in Trinidad are four years old and have fruited this year for the first time. "It gives promise of becoming an abundant bearer, and its product is of a quality to give it a place at once upon the markets as a first-class coffee of the Mocha type of bean." "In growth, in crop, in quality and in facility for preparation it promises to prove a plant of the best class for cultivation in the West Indies." A curious lime-attracting algæ was determined at Kew as *Schizotrix fasiculata*, Gomoul. This algæ attracts to itself large quantities of lime, the incrustations of which are freely apparent to the naked eye.

The experiments in the fermentation of saccharine fluids have been continued, and the various stages of the indigenous or native ferments, or yeasts, have been closely watched. It has been ascertained that the ferments which occur naturally or spontaneously in cane juice or other saccharine fluids are quite distinct in Trinidad from those of the neighboring island of Jamaica. Professor Jorgensen reports that he has separated several distinct species of alcoholic ferments from the material from Trinidad, an account of which will probably be found in the forthcoming revised edition of his valuable work on fermentation. "The importance of work in this direction is better understood when it is stated that it has been found possible to induce certain flavors by using certain ferments in the 'wash,' or material from which rum is distilled, and that the flavor of distilled liquor can in this way be brought under the control of the operator."

KING'S AMERICAN ECLECTIC DISPENSATORY. New edition. Entirely rewritten and enlarged. By Harvey W. Felter, M.D., Adjunct Professor of Chemistry in the Eclectic Medical Institute, Cincinnati, O., and John Uri Lloyd, Ph.M., Professor of Chemistry and Pharmacy in the Eclectic Medical Institute, Cincinnati, O. Two-volume edition, royal octavo, each volume containing over 950 pp., with complete indexes. Cloth, $4.50 per volume, post-paid. Sheep, $5.00 per volume, post-paid. Advance subscriptions received by the Scudder Brothers Co., No. 1009 Plum Street, Cincinnati, O., General Agents.

The following catalogues and announcements have been received:

CATALOGUE OF THE UNIVERSITY OF PENNSYLVANIA. 1897–98.

ALBANY COLLEGE OF PHARMACY. Catalogue, 1897–98. Announcement, 1898–99.

BUFFALO COLLEGE OF PHARMACY. Thirteenth Annual Announcement, 1898–99.

THE BROOKLYN COLLEGE OF PHARMACY. Eighth Annual Announcement. Session of 1898–99.

NORTHWESTERN UNIVERSITY SCHOOL OF PHARMACY. Circular of Information for Session 1898–99.

UNIVERSITY OF IOWA (DEPARTMENT OF PHARMACY). Announcement for 1898–99.

COLLEGE OF PHARMACY OF THE CITY OF NEW YORK. Prospectus for session of 1898-99.

CLEVELAND SCHOOL OF PHARMACY. Seventeenth Annual Announcement, session of 1898-99.

MASSACHUSETTS COLLEGE OF PHARMACY. Thirty-second Annual Catalogue, 1898-99.

THE UNIVERSITY OF MINNESOTA. Bulletin of the College of Pharmacy, June 30, 1898.

CHICAGO COLLEGE OF PHARMACY. The School of Pharmacy of the University of Illinois. Thirty-ninth Annual Announcement.

PRICE LIST OF SHARP & DOHME.

AMERICAN PHARMACEUTICAL ASSOCIATION.

A program of the Forty-sixth Annual Meeting, to be held in Baltimore, August 29 to September 12, 1898, has been issued by the Local Committee, and includes list of hotels with rates, and partial list of Baltimore's attractions and directory of points of interest. Headquarters will be at Lehmann's Hall, 856 N. Howard Street, Baltimore.

The Reception Committee proposes to meet all incoming trains and will escort visitors to their respective hotels. Any one missed by the committee should take Maryland Avenue cars direct to Lehmann's Hall.

OFFICIAL PROGRAM.

Authorized by the Council.

Monday, August 29th.

11.00 A.M. Meeting of Council.
3.00 P.M. First General Session.
8.30 P.M. Reception of visiting members, delegates and ladies, to be followed by concert and hop.

Tuesday, August 30th.

10.00 A.M. Second General Session.
4.00 P.M. Carriage ride to points of interest and through Druid Hill Park.
8.00 P.M. Meeting of Commercial Section.

Wednesday, August 31st.

10.30 A.M. All day ride on the Chesapeake, including visit to Naval Academy and historical rooms of the State House at Annapolis. Meals to be served *en route*.

Thursday, September 1st.

10.00 A.M. First Session of Scientific Section.
3.00 P.M. Second Session of Scientific Section.
8.00 P.M. Third Session of Scientific Section.

Friday, September 2d.

10.00 A.M. First Session of Educational and Legislative Section.
3.00 P.M. Second Session of Educational and Legislative Section.
7.00 P.M. Trolley-car ride through city and to Entertainment at Electric Park.

Saturday, September 3d.

10.00 A.M. Third Session of Educational and Legislative Section.
3.00 P.M. Third General Session.

Social features to be complimentary, tendered visiting members, delegates and ladies by drug trade of Baltimore.

PROPOSED SUBSCRIPTION EXCURSIONS.

Monday, September 5th.

To Gettysburg Battlefield and Blue Ridge Mountains.

Tuesday, September 6th.

To Washington and Mount Vernon.

HOTELS.

NOTE.—Parties wishing to secure hotel accommodations are earnestly requested to notify Local Secretary, Henry P. Hynson, 423 N. Charles Street, Baltimore, Md., as early as possible, stating house preferred, number, location, style and price of rooms desired, as near as may be.

OBITUARY.

Mitchell G. Rosengarten, a member of the firm of Rosengarten & Sons, died on the morning of May 19, 1898, at his residence, 1826 Spruce Street, Philadelphia.

He was the second son of the late George D. Rosengarten, a native of Germany, who came to this city in 1819, and in 1822 established the chemical industry still carried on by his sons and grandsons.

The elder Mr. Rosengarten died in 1890, leaving five sons, four of whom continue the business, the fifth son being a member of the Philadelphia Bar.

The subject of this sketch was born in Philadelphia, on September 10, 1829; he was educated at the school of Thomas D. James, and subsequently attended the lectures of the Philadelphia College of Pharmacy. He studied chemistry under the late James C. Booth and Martin Boyé, in their private laboratory.

After working for five years in his father's laboratory, Mr. Rosengarten became a member of the firm, which then took the name of Rosengarten & Sons, an elder brother, Mr. S. G. Rosengarten, being admitted to the firm at the same time.

Mr. Rosengarten took an active part in the business, made several journeys abroad, and was frequently present at the meetings of different pharmaceutical and chemical associations in this country.

He was married to Miss Emily Huntsman, of Flushing, N. Y., and leaves three sons and two daughters.

Mr. Rosengarten was a member of the Union League, American Pharmaceutical Association, Philadelphia College of Pharmacy, Franklin Institute and other organizations.

Mr. Rosengarten, although living very quietly, was well known for his charities and many acts of kindness. He had a large acquaintance with the members of the drug trade and the pharmacists and chemists at home and

abroad, and his death called forth many expressions of regret and sympathy for his family and his firm.

He was a useful citizen and served cheerfully in every capacity in which he was called on. His kindly nature and warm sympathy made him very popular, both in his own business world and with a large circle of friends, by all of whom his death is greatly felt.

NOTES AND NEWS.

Silva of North America.—The eleventh volume of the "Silva of North America," by Charles Sprague Sargent, has appeared, and is devoted to the genus Pinus. Thirty-four species are described. The genus has representatives in all parts of eastern North America, except the basin of the Central Mississippi and the elevated plains east of the Rocky Mountains.

High Per Cent. of Quinine.—A hybrid of Cinchona Calisaya Ledgeriana and Cinchona Succirubra, 20 years old, raised in the gardens of the Government cinchona plantations at Java, from seed, contained the highest amount of quinine yet on record. This remarkable tree yielded 14·13 per cent. quinine sulphate. The report says that this is calculated on "air-dry" bark, a not over accurate statement, since it cannot now be compared to the other analyses, which are figured at 105° C. Cuttings of this tree, brought upon the market, were sold for about $4.00 apiece.—*Excerpt from a letter from J. B. Nagelvoort, June, 1898.*

The First Nathan Lewis Hatfield Prize for Original Research in Medicine.—The College of Physicians of Philadelphia announces through its Committee that the sum of $500 will be awarded to the author of the best essay in competition for the above prize.

SUBJECT: "A Pathological and Clinical Study of the Thymus Gland and its Relations."

Essays must be submitted on or before January 1, 1900.

Each essay must be typewritten, designated by a motto or device, and accompanied by a sealed envelope bearing the same motto or device, and containing the name and address of the author. No envelope will be opened except that which accompanies the successful essay.

The committee will return the unsuccessful essays if reclaimed by their respective writers or their agents within one year.

The committee reserve the right not to make an award if no essay submitted is considered worthy of the prize.

The treatment of the subject must, in accordance with the conditions of the trust, embody original observations, or researches, or original deductions.

The competition shall be open to members of the medical profession and men of science in the United States.

The original of the successful essay shall become the property of the College of Physicians.

The Trustees shall have full control of the publication of the memorial essay. It shall be published in the Transactions of the College, and also, when expedient, as a separate issue.

Address, J. C. Wilson, M.D., Chairman, College of Physicians, 219 South Thirteenth Street, Philadelphia, Pa.

DIED AUGUST 24, 1898.

Professor Henry Trimble, A.M., Ph.M.

EDITOR OF THIS JOURNAL.

A Memoir will appear in a subsequent number.

THE AMERICAN

JOURNAL OF PHARMACY

SEPTEMBER, 1898.

PROXIMATE ANALYSIS OF THE BARK OF PISCIDIA ERYTHRINA.

BY HERMAN BERBERICH, P.D.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 178.

Piscidia erythrina, or Jamaica dogwood, belongs to the natural order Leguminosæ, and is a native of the West India Islands.

A fluid extract of the bark was several years ago introduced to the notice of the medical profession, and it is stated by physicians to be a direct sedative, producing narcotic effects, which are refreshing, and not followed, as in the case of opium, by hyperæmia of the brain, nausea and general nervous disturbance. It is said to be also of value in bronchitis, asthma, spasms of the muscles, due to functional causes, chorea, tetanus, and especially in toothache, to relieve pain.

By treating the fluid extract of the bark with slaked lime, Edward Hart[1] obtained a crystalline substance which he considered to be the active principle of the bark. The crystals separated on the sides and bottom of the flask after the mixture had stood for two or three days. They were accompanied by a resinous substance. The crystals were purified by recrystallization from alcohol, and were finally obtained in a nearly colorless condition. After repeated recrystallization from alcohol, the substance was obtained in the form of small, yellowish crystals, which, under the microscope, appeared to consist of four- or six-sided prisms. The same investi-

[1] *Amer. Chem. Jour.*, 1883, p. 39; *Therapeutic Gazette*, 1883, pp. 97, 98.

gator further described the crystals as "insoluble in water; slightly soluble in cold, much more in boiling alcohol; only slightly soluble in ether; easily soluble in benzene and chloroform. It is dissolved by strong hydrochloric acid and sulphuric acid, but reprecipitated apparently unchanged by dilution with water. Fehling's solution failed to detect glucose or sucrose. The alcoholic solution is neutral to litmus paper. Alcoholic lead acetate solution does not produce a precipitate." The crystals melted at 192° C. An elementary analysis of them led to the formula, $C_{29}H_{24}O_8$. They were named *piscidia.*

The work of the present writer consists of a proximate analysis of the bark and a special search for the principle called *piscidia.* The proximate analysis was conducted according to the scheme of Dragendorff. The material was used in No. 40 powder. The percentages stated are for the air-dry bark.

	Per cent.
Petroleum ether extract:	
Caoutchouc, saponifiable wax and fat, etc.	0·61
Ether extract:	
Glucose, saccharose, resin, *piscidia*, etc.	0·86
Absolute alcohol extract:	
Glucose, saccharose, resin, etc.	0·51
Water extract.	
Mucilaginous and albuminous substances, 14·78 per cent.; dextrin, 3·38 per cent.; saccharose, 1·20 per cent., etc.	22·43
Alkaline-water (2 per cent. NaOH solution) extract:	
Mucilaginous and albuminous substances, 1·28 per cent., etc.	4·40
Acidulated water (1 per cent. HCl solution) extract:	
Pararabin, 1·35 per cent.	4·00
Starch	1·34
Moisture	9·25
Ash:	
Potassium, sodium, calcium, magnesium, chlorine and phosphoric oxide	10·55
Cellulose and undetermined substances	46·05
Total	100·00

Tannin was not found. The acidulated water extract contained calcium phosphate but not calcium oxalate.

After completing the proximate analysis a special search was made for the principle *piscidia.* The method used by Hart was followed. For this purpose a fluid extract was made by exhaust-

ing 500 grammes of the bark with an alcohol of 78 per cent. strength. The extract was concentrated by distilling off the alcohol until about 100 c.c. of liquid remained in the flask. This liquid was poured into a beaker containing 30 grammes of quicklime, which had been previously slaked with enough water to make a thick paste. The milk of lime and concentrated extract were intimately mixed, the mixture allowed to stand in a warm place for a half hour, then strained, and the residue pressed. The liquid was then filtered through paper to obtain it in a clear condition. Water was now added to the clear filtrate until the latter was rendered slightly turbid. The liquid was then set aside for crystallization to take place. After two or three days crystals separated upon the sides and bottom of the beaker. They were accompanied by a resinous substance, from which they were purified by recrystallization from alcohol. By adding water to the mother-liquor from these crystals, a second crop, still more impure, was obtained. These crystals possessed all of the properties assigned to *piscidia* by Hart.

COTTON ROOT BARK.

By Frank William Morgan, P.D.

Cotton root bark was first introduced to the attention of the medical profession by Dr. Bouchelle, of Mississippi, who, in an article in the *Western Journal of Medicine and Surgery*, August, 1840, stated it to be, in his opinion, an excellent emmenagogue, and not inferior to ergot in promoting uterine contraction. He stated that it is habitually resorted to by the slaves of the South for producing abortion, and thinks it acts in this way without injury to the general health. To assist labor he used a decoction (4 ounces to a pint) the dose of which was a wineglassful.

In the *Nashville Journal of Medicine and Surgery*, July, 1855, Dr. J. T. Shaw stated that he esteemed it as superior to any other emmenagogue, and equal to ergot as a parturient, while attended with less danger. He used a tincture made by macerating 8 ounces of the dried bark in 2 pounds of diluted alcohol for two weeks. Of this he used a drachm three or four times daily.

Mr. Weatherby (Amer. Jour. Pharm., May, 1861) denies the statement that this bark is used as an abortificant by the slaves of the South. He states that for about a year he was in one of the finest cotton-growing districts of the South, and that he asked some

twenty physicians, and also the overseers of some large plantations, as to their having heard of this use, but found nothing to corroborate the statement.

The bark was examined chemically by Professor Wayne (AMER. JOUR. PHARM., 1872, p. 289), W. C. Stahle (*Ibid.*, 1875, p. 457) and C. P. Drueding (*Ibid.*, 1877, p. 386).

Both Wayne and Stahle confined themselves principally to the investigation of the resin. Wayne found a yellow resin, turning red on exposure, which he considered insoluble in chloroform, ether, benzol and aqua ammonia, but found it soluble in alcohol. Stahle obtained a resin under several different conditions which was invariably of a red color, and the solubility he found to be as follows: In alcohol, 14 parts; in ether, 25 parts; in chloroform, 15 parts; in benzol, 122 parts. The difference in the color of the resin found by the two investigators appears to be due to the fact that Professor Wayne used fresh bark, while Mr. Stahle used a dried product. It is well known that the fresh bark contains a substance which is yellow, and which, on exposure to light and air, becomes red.

Mr. Drueding found the constituents of the bark to be: Of inorganic substances K, Na, Ca, Mn, Fe, H_2SO_4 and H_3PO_4; of organic: red and yellow resin, resinous coloring matter, fixed oil, gum, sugar, tannin and chlorophyl. About 1 ounce of fixed oil was obtained from 5 pounds of root.

The material used in this investigation was fresh and gathered during the winter months. The dried bark is from 2 to 4 lines in thickness (when fresh from 2 to 4 mm.), with very thin cork, which is easily removable. The color, when fresh, is yellow, and, after exposure to the air and light, changes to a reddish-brown. The outer sur face is reticulately wrinkled, possesses numerous small, round, black dots of a fungus or lichen; occasionally round scars and transverse warts appear which are fissured in the middle along their whole length (being lenticels). The inner surface is yellowish-white, reticulate and shining, the bast being easily separable from the rest of the bark in thin, transparent, porous, reticulately-marked plates. After peeling off the bast the inner bark is whiter in appearance and contains numerous small, round dots.

The bark (*Figs. 1* and *2*) consists of from 8 to 12 layers of tabular, tangentially-elongated cork cells (*c*), generally very much

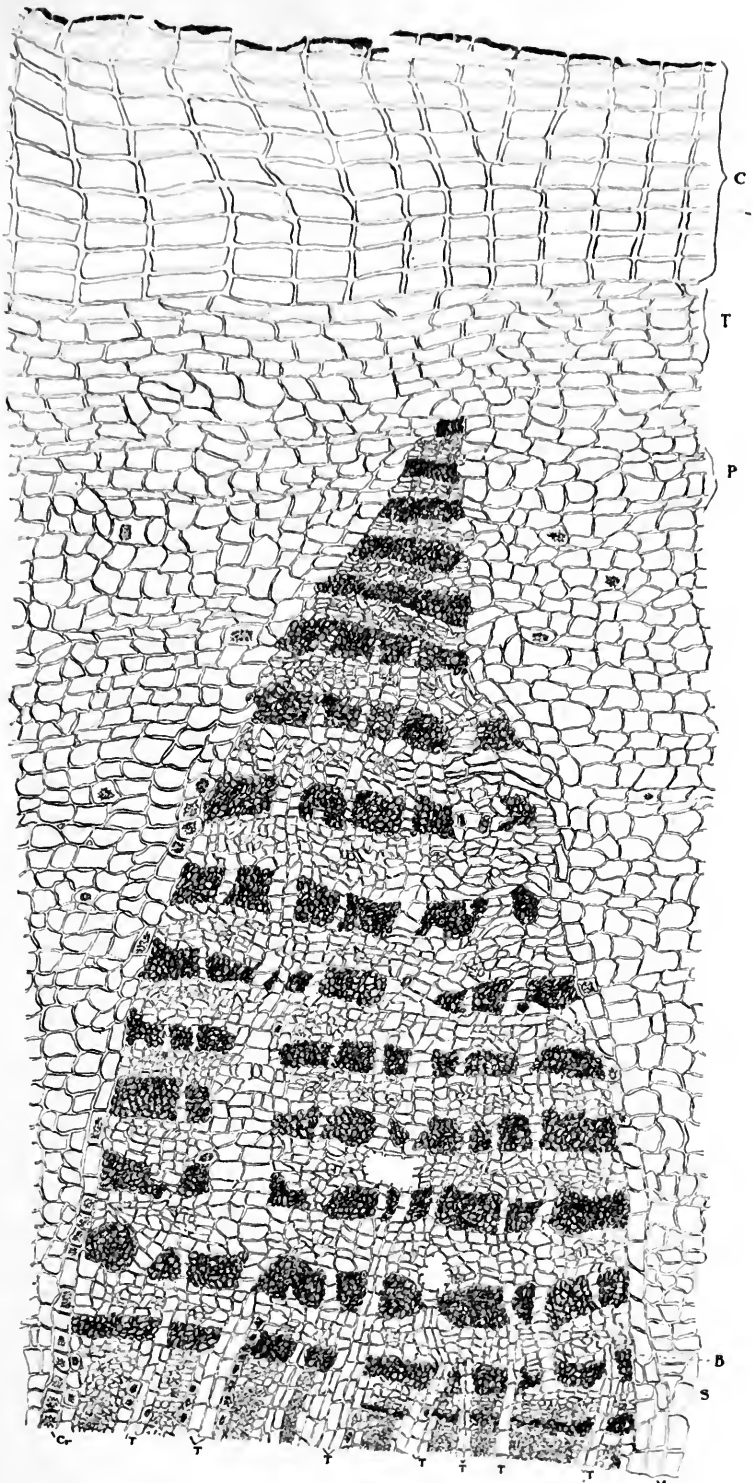

FIG. 1.—Transverse section of Cotton Root Bark. (*c*) cork; (*cr*) crystals of calcium oxalate; (*b*) bast; (*m*) medullary rays; (*T*) cells containing tannin; (*s*) sieve. (About 180 diameters.)

broken and eroded on the outer surface, and containing in the outer layer tannin and coloring matter. Underneath this corky layer lies a parenchymatous tissue (*p*) consisting of a number of layers of thin-walled cells. Into this latter extends a wedge-shaped mass of bast fibres (*b*). The latter is arranged in layers, separated from one another by layers of parenchyma (*p*) and sieve cells (*s*), the lower layers being very much broken by short medullary rays (*m*). There also occur secretion reservoirs (*s*), and cells containing starch, tannin and oxalate of calcium crystals. The latter are rosette-shaped and relatively numerous in the inner bark. Frequently the secretion reservoirs can be seen by the naked eye, especially if the soft material is freshly sectioned.

In making a micro-chemical examination of the bark for tannin, some of it was macerated for two weeks in an aqueous solution of copper acetate (method employed and suggested by Professor Kraemer), which has the effect of precipitating tannin as reddish masses in the cells containing it. On sectioning and examining with a magnification of twenty-five diameters, tannin was identified in the outer row of cork cells, but it occurs most abundantly, however, in the first layers of parenchyma just beneath this cork layer. This tannin-containing parenchyma tissue is from one to five cells in width. Tannin also occurs in isolated parenchyma cells throughout the bark, especially lying between the wedge-shaped groups of bast fibres and in the cells lying adjacent to the groups of bast. Of the latter, generally only those cells contain tannin which are arranged on the outer and inner tangential surfaces of the bast bundles. It is also found in the secondary medullary ray cells.

Calcium oxalate crystals are found occurring frequently in the primary medullary rays, and in the cells lying on either side of the cells of the smaller rays; occasionally in the parenchymatous tissue of the outer bark.

Secretion reservoirs (*s*), containing oil and resin, occur frequently in among the parenchymatous tissue lying near the phloem. These are large enough to be distinguished (in fresh bark) by the naked eye. The reservoirs are apparently of lysigenous origin. The contents were found to be soluble (on maceration); in acetone and alcohol very soluble; in chloroform and dilute alcohol slightly soluble; insoluble in water. The bark, macerated in alcohol and ace-

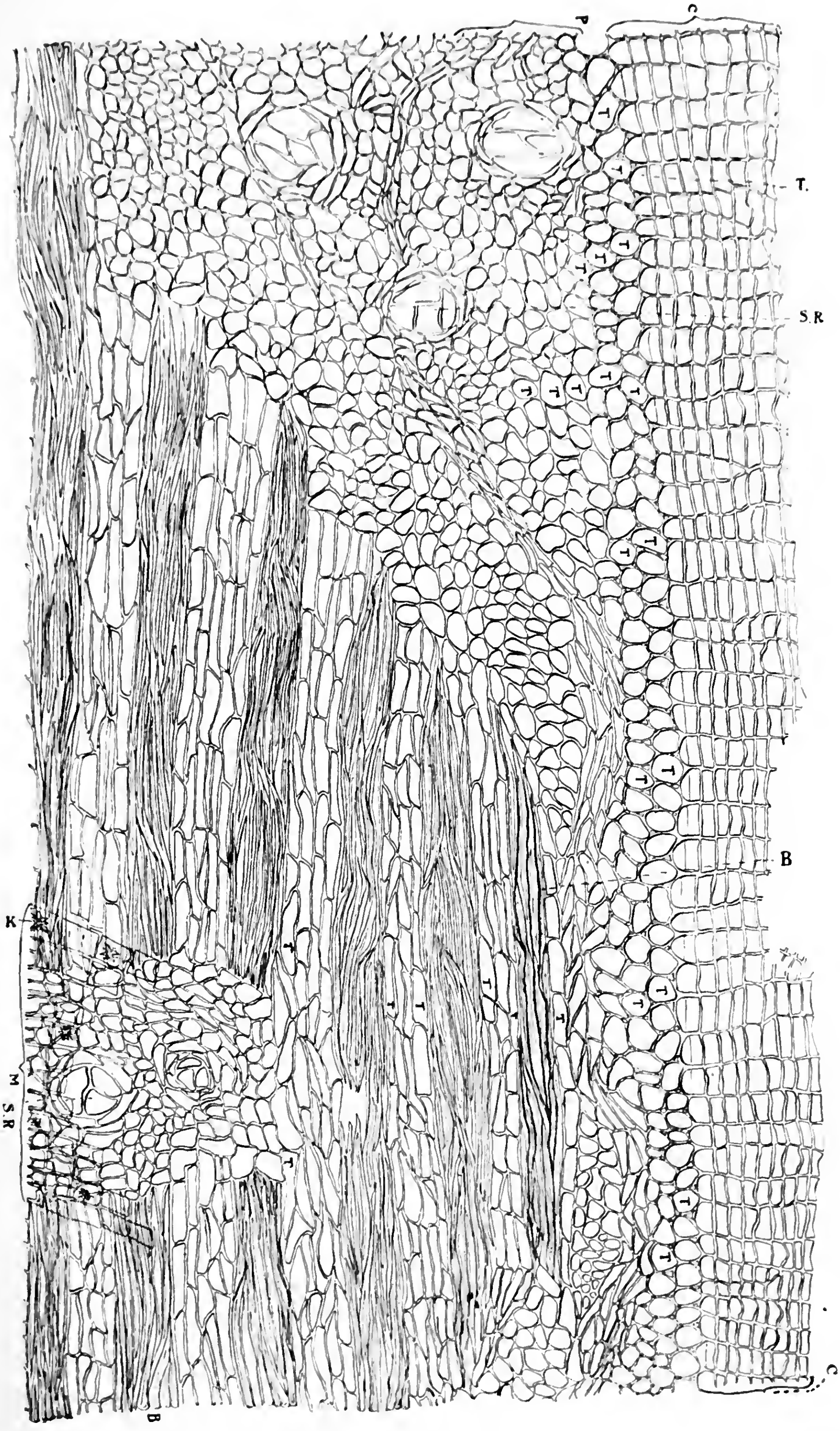

FIG. 2.—Longitudinal section of Cotton Root Bark. (*c*) cork cells; (*p*) parenchyma; (*b*) bast fibres; (*S. R.*) secretion reservoirs; (*m*) medullary rays; (*t*) cells containing tannin; (*cr*) crystals of calcium oxalate.

tone, became lighter in color; that macerated in chloroform developed a purplish-brown color.

The secretion reservoirs in cotton root bark appear not to have been mentioned heretofore, and as it is not unlikely but that it is in the products secreted here that the value of this drug depends, further botanical and especially micro-chemical study on these reservoirs or glands is desired. Furthermore, a detailed study of the origin of these secretion reservoirs is desirable.

NOTE ON TESTING FORMALDEHYDE.

By Lyman F. Kebler.

During the past few years formaldehyde has been forging to the front very rapidly as a preservative and disinfectant. As a disinfectant it has gained much favor with the medical profession, so much so in fact, that the Pharmacopœial Research Committee has deemed it desirable to investigate the relative efficiency of the various methods proposed for estimating the strength of the formaldehyde solutions on the market. This duty was delegated to Prof. Carl E. Smith, whose results appeared in the February number of this Journal of the current year.

As is naturally to be expected when an unusual demand arises for a high-priced commodity, articles of various degrees of strength and purity find their way into commerce. And in devising a method for assay, all the various contaminating and disturbing elements must be taken into consideration.

I had been using the ammonia process proposed by L. Leger,[1] and applied by various workers during the past few years. In every case the ammonia was allowed to react with the formaldehyde over night, and the results always proved satisfactory; 2 c.c. (which is practically 2 grammes) of the formaldehyde were added to 25 c.c. of normal ammonia solution and allowed to stand over night.

Shortly after the appearance of Professor Smith's contribution, I received a sample of formaldehyde, with the request that a report was desired on short notice. Calling to mind the results of the above paper, it was naturally inferred that by making a suitable correction the formaldehyde could be estimated by allowing it to

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[1] *Ber. d. deut. Chem. Ges.*, **16**, 1333.

remain in contact with the normal ammonia solution for about fifteen minutes. This was done. The yield with the correction was about 18 per cent., and was accordingly so reported. The solution, however, was tested in the usual way by allowing it to stand over night in contact with the ammonia, and to my surprise the result was not 18 per cent., but 37·5 per cent., or about 100 per cent. above what was reported the day previous. You can imagine my mortification to be compelled to make a subsequent report of 37·5 per cent. on the article that had been reported only the day previous as containing 18 per cent.

This is not the only sample that has behaved in this way, but a series of experiments showed that it was the rule, rather than the exception, that the reaction between the ammonia and the formaldehyde was rather slow. Consequently, it is undesirable, generally, to report results on a reaction of less than six hours' duration. The results of the above experiments varied from 16 per cent. for fifteen minutes to 37·5 for six hours. Neither were the results constant, for duplicates of the same sample. Why this peculiarity, it is difficult to say.

In my opinion, the only reason that Professor Smith arrived at the results that he did, was because the number of samples worked on was too limited. They evidently were not representative of the commercial article.

In conclusion, I wish to place myself on record with those who have found it necessary to allow considerable time for completed reaction between the ammonia and the formaldehyde. And it is not safe to report the per cent. of absolute formaldehyde in a solution, on a reaction continued for less than six hours.

35 Poplar Street, Philadelphia, Pa.

STANDARDS FOR BLACK AND WHITE MUSTARD SEED.[1]

John Uri Lloyd.[2]

The work was undertaken solely with a view to establish a standard concerning starch in powdered black and white mustard seed. Although starch is not a constituent of ripe mustard seed, it

[1] This investigation was undertaken under the auspices of the Research Committee of the American Pharmaceutical Association.

[2] Read at the Baltimore meeting of the American Pharmaceutical Association.

has been found in commercial powdered mustard[3] and under conditions that preclude the idea of intentional admixture. The presence of starch-bearing weed seeds, and of scattered grains of wheat or of contaminations caused by using second-hand sacks with adhering flour or meal, will account for such reactions. It is therefore desirable that a method should be found that will approximately indicate the proportion of starch.

Black Mustard Seed.—The ordinary method of detecting starch by adding U.S.P. iodine test solution to the aqueous decoction fails with black mustard, on account of the ready absorption of iodine by the oil of mustard that is at once developed when black mustard comes in contact with water. This fact was pointed out[4] by the author in 1895.

If iodine solution is added, and much starch is present, a blue coloration is developed, which remains for a short time only, then fades and disappears. A considerable excess of iodine, however, will effect a more permanent blue coloration, but affords no test concerning the proportion of starch.

If small amounts of starch are present, iodine will show no blue color at all. Hence the necessity of a rapid and convenient method by means of which a permanent starch reaction can be obtained, even when small quantities of starch are present.

Preliminary Work.—The idea of abstracting the disturbing element *sinigrin* by means of solvents prior to the testing for starch was soon abandoned as impracticable and hopeless. Then it was attempted to precipitate the sinigrin by means of the salts of heavy metals, such as silver nitrate, mercurous nitrate, or lead acetate with no satisfaction.

By subsequent and prolonged experiments with copper sulphate, however, it was shown that this substance had the capacity of preventing the formation of oil of mustard, even when employed in as weak a solution as 0·2 per cent. This reaction, however, is not new.[6]

Acting upon this fact, and carrying the principle further, we were enabled to arrive at several useful working methods for starch

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[3] *Bulletin of Pharmacy*, Vol. XI, 1897, p. 64.

[4] *Proc. Am. Pharm. Assoc.*, 1895, p. 194–199.

[5] Dr. J. Gadamer, *Ueber die Bestandteile des schwarzen und des weissen Senfsamens. Archiv der Pharmazie*, Vol. 235, 1897, pp. 44–114.

[6] P. Carles, *Pharm. Jour. and Trans.*, 4th series, Vol. VI, 1898, p. 73.

detection in mustard, among which those yielding the most satisfactory results are herein presented.

I. IODINE METHOD.

This method was suggested in our report[4] of 1895. It is easy of execution and rather sharp in reaction. We would suggest for it the following slightly modified directions:

Put into a large test tube 1 gramme of the ground black mustard seed and 10 c.c. of water and 1 c.c. of iodine test solution, U.S.P. Boil until the brown color has disappeared. Cool the liquid and add (by means of a pipette) *1 drop* of iodine test solution, U.S.P., allowing it to flow down the side of the test tube and mix gradually with the upper part of the liquid. If as little as 0·1 per cent. of starch is present, a distinct and quite permanent blue or greenish-blue layer appears in the upper part of the fluid, which, by contrast, is very perceptible.

II. COPPER METHODS.

A. Copper Sulphate and Iodine.

Solutions.—(1) *Copper Sulphate Solution* (0·2 per cent.). Dissolve *1 gramme* of pure crystallized copper sulphate in water to make 500 c.c. of solution.

(2) *Solution of Iodine* (2 per cent.), iodine test solution, U.S.P.

Directions.—Put 1 gramme of the powdered black mustard into a perfectly dry test tube, add 10 c.c. of the (0·2 per cent.) copper solution and boil. No odor of mustard oil will be developed. Cool, and add from 1 to 3 or four drops of iodine test solution, allowing it to flow down the side of the test tube, taking care to leave a layer of uniodized liquid below, in order that the contrast in color may be observed. The upper layer will turn blue if as little as 0·3 per cent. of starch is present.

Remarks.—The copper solution commended is sufficiently dilute to offer no interference with the color reaction on account of its own blue color. It was found that at no practical concentration (beginning at 2 per cent.) does the color of the copper solution interfere with the sensitiveness of the test. This strength (0·2 per cent.) is sufficient to prevent the formation of oil of mustard even upon boiling, and we prefer it to more concentrated solutions.

By careful manipulation the presence of 0·2 per cent. of starch can be distinctly demonstrated by this test. Yet, from 0·3 per cent.

upward the starch test by this method is exceedingly plain and quite permanent. An excess of iodine will cause the precipitate to become green, which must be especially borne in mind when testing for small quantities of starch.

B. Copper Sulphate and Potassium Iodide.

Solutions.—(1) Copper sulphate solution (0·4 per cent.). Dissolve 4 grammes of pure crystallized copper sulphate in water to make 1,000 c.c.

(2) Potassium iodide solution (5 per cent.), 5 grammes of crystallized pure potassium iodide are dissolved in water to make 100 c.c.

Directions.—Put *1 gramme* of the powdered black mustard seed into a perfectly dry test tube; add *10 c.c.* of the copper solution and boil. Cool, and carefully add, by means of a burette, about ½ *c.c.* of the above solution of potassium iodide. After a short time, an exceedingly plain and decidedly permanent starch reaction will be developed near the bottom of the tube in the presence of as little as 0·3 per cent. starch.

Remarks.—This test is based on the interesting reaction that takes places when copper sulphate and potassium iodide are brought in contact. Insoluble white cuprous iodide is formed and iodine is liberated according to the following equation:

$$2Cu\,SO_4 + 4KI = 2K_2\,SO_4 + Cu_2\,I_2 + I_2$$

The iodine liberated produces the starch reaction.

Yet, the chemical reaction does not take place in too dilute solutions. The concentration of the liquids and probably other factors influence the speed and completeness of the reaction.

The above-named proportions gave the most satisfactory results and were established by a lengthy series of experimentation.

III. POTASSIUM IODIDE METHOD.

It was found during experimentation with the foregoing test that on boiling powdered mustard seed with potassium iodide solution, the formation of mustard oil is likewise entirely avoided. The idea that potassium iodide be used in the place of copper sulphate in the same manner as in the test II A. then suggested itself. On testing the boiled liquid, after cooling, with iodine U.S.P. test solution, the result proved to be eminently satisfactory. To such an extent is this method in our favor that we now give it the preference over all others in the testing of powdered black mustard seed for starch.

Solutions.—(1) *Potassium Iodide Solution* (5 per cent.), 5 grammes of crystallized pure potassium iodide are dissolved in water to make 100 c.c.

Iodine Test Solution U.S.P. (2 per cent.).

Directions.—Put 1 gramme of the powdered black mustard seed into a perfectly dry test tube; add 10 c.c. of the above potassium iodide solution and boil. Cool, and carefully add to the surface of the bright yellow liquid from one to three drops of iodine test solution, U.S.P., taking care to allow it to flow down the side of the tube, upon the surface of the liquid. The contrast in color between the iodized part and the lower liquid is very striking, and plainly visible with as little as 0·1 per cent. of starch.

Remarks.—The blue coloration by this method is perhaps not quite as permanent as in the copper experiments, yet it is sufficiently characteristic at the time of its formation, and for a reasonable time afterward.

Summary for Black Mustard Seed.—(1) Four methods have been indicated which we submit. As before stated, the potassium iodide test (Test III), seems to us to be preferable.

(2) The potassium iodide test (Test III) indicates the presence of 0·2 per cent. of starch, with all certainty, and of 0·1 per cent. by closely observing the contrast in color.

(3) Hence the following recommendation is made.

(*a*) If not more than 1 per cent. of starch (in the form of starch-bearing seeds, etc.) is considered admissible in black mustard of commerce, the Pharmacopœia should demand that:

When mixed thoroughly with *nine* times its weight of powdered black mustard seed, previously ascertained to be free from starch, the mixture, if submitted, in the quantity of *one gramme*, to the test indicated under Test III, should not give a plain blue starch reaction.

(*b*) If it is desirable to make the pharmacopœial limit lower than 1 per cent. of starch, a correspondingly smaller amount of starch-free mustard seed should be added.

(*c*) If pure black mustard free from starch is demanded, by the U.S.P. when submitted to the foregoing test (Test III), it should show no blue reaction.

WHITE MUSTARD SEED.

The odor of oil of mustard (allyl mustard oil) is not developed when powdered white mustard is boiled with water, a fact which

the researches of Dr. Gadamer (5) and his predecessors sufficiently explain. Yet, with powdered white mustard seed containing starch, the starch-iodine color also disappears, but less rapidly than it does with black mustard seed.

Fortunately, we find that the use of solution of iodide of potassium with white mustard likewise checks the evanescence of the starch reaction, when it is employed in the manner directed for black mustard seed under Test III. Indeed, when applied to white mustard seed, the test is even more sensitive by far than with black mustard, for by means of it we can detect the presence of as little as 0·05 per cent. starch with certainty.

TESTING WHITE MUSTARD FOR STARCH.

Solutions.—(1) *Potassium Iodide Solution* (5 per cent.), 5 grammes of crystallized pure potassium iodide are dissolved in water to make 100 c.c.

(2) *Iodine Test Solution*, U.S.P. (2 per cent.).

Directions.—Put 1 gramme of the powdered white mustard seed into a perfectly dry test tube, add 10 c.c. of the above potassium iodide solution and boil. Cool and carefully add to the surface of the bright yellowish liquid *one drop* of iodine test solution, U.S.P., taking care in adding iodine to allow it to flow down the side of the tube, upon the surface of the liquid. The contrast in color between the iodized upper part and the lower liquid is plainly visible with as little as 0·05 per cent. starch, in which case the coloration of the upper part is decidedly bluish and is permanent for a reasonable length of time.

Summary for Powdered White Mustard Seed.—(*a*) If not more than 1 per cent. of starch (in the form of starch-bearing seeds, etc.) is considered admissible in white mustard of commerce, the Pharmacopœia should demand that :

The sample be mixed thoroughly with *twenty-four* times its weight of powdered white mustard seed previously ascertained to be free from starch; the mixture, if submitted, in the quantity of *1 gramme*, to the test indicated under white mustard, should not give a plain blue starch reaction.

(*b*) If a lower limit is desired by the Pharmacopœia, a correspondingly smaller amount of starch-free white mustard seed should be employed in making the dilution.

(*c*) If pure white mustard, free from starch, is demanded by the U S.P., it should show no bluish coloration whatever when submitted to the same test.

In conclusion, the author extends sincere thanks to Dr. Sigmond Waldbott, Librarian of the Lloyd Library, for detailed assistance both in experimentation and literary research.

CERTAIN ALKALOIDAL PERIODIDES AND THE VOLUMETRIC ESTIMATION OF ALKALOIDS AS HIGHER PERIODIDES.[1]

BY A. B. PRESCOTT AND H. M. GORDIN.

In continuation of previous work upon perhalides of organic bases (Prescott, Gomberg, Trowbridge and others, 1895–98 ; *J. Am. Chem. Soc.*, **17,** 775, 859 ; **18,** 28, 91, 331, 347 ; **19,** 322, 558) the authors have now obtained the following, as compounds of quite constant composition :

Atropine hydriodide octaiodide, $C_{17}H_{23}NO_3.HI.I_8$.
Strychnine hydriodide hexaiodide, $C_{21}H_{22}N_2O_2.HI.I_6$.
Brucine hydriodide hexaiodide, $C_{23}H_{26}N_2O_4.HI.I_6$.
Morphine hydriodide triiodide, $C_{17}H_{19}NO_3.HI.I_3$.
Aconitine hydriodide hexaiodide, $C_{33}H_{45}NO_{12}.HI.I_6$.

The morphine periodide obtained constant in the given conditions is the same found by Jörgensen in 1870. The composition of the higher periodide of aconitine above written, on the alkaloid formula of Dunstan, is given provisionally. The same conditions insure the formation of the periodide of caffeine, obtained by Gomberg in 1896, namely, caffeine hydriodide tetraiodide.

The conditions necessary for these formations are only those of precipitation from quite dilute water solutions with a constant excess of iodine from first to last, the alkaloid being in a salt or acid solution. In such conditions these are the highest periodides that can be formed. In precipitation from water solutions with excess of the alkaloidal salt, lower periodides are formed in case of atropine, strychnine, brucine, aconitine, not in case of morphine. Some of these lower periodides the authors have analyzed, and others will be examined. In character and behavior the periodides of the

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[1]Abstract of a paper presented at the Baltimore meeting of the American Pharmaceutical Association.

vegetable alkaloids agree in general with the perhalides of pyridine and its more immediate derivatives, as these have been previously studied in the same laboratory. Also the reactions of these periodides of the bases of the pyridine type are generally the same as those of caffeine pentiodide, formed when caffeine is in acidulated solution, as found by Gomberg. And these bodies are to be studied with perhalides in general, and with the question of the orders of bases capable of forming perhalides, and the relation of these, in structure, to the double halides. The production of a periodide of bromtriphenylmethane, about to be published by Gomberg, is of interest as an organic perhalide, destitute of any element of the nitrogen family, as was also the iodonium perhalide obtained by Victor Mayer, in 1894, and the sulphon periodide reported in this country by Kastle in the same year.

The higher periodides of the vegetable alkaloids, as named above, are sufficiently stable to give very constant results in the analysis, both for the additive iodine and for that of the hydriodide. Obtained in crystalline forms they were found to have the same composition as the amorphous precipitates after washing and drying. In the volumetric procedure, however, washing is avoided, an aliquot portion of the filtrate being taken in which to titrate back with the thiosulphate for the excess of iodine added. In this way is obtained a very accurate measure of the iodine consumed in supplying the additive iodine of the periodide. The more firmly bound iodine of the alkaloidal hydriodides, not responding to reducing agents, is supplied by the iodine of the potassium iodide, that of Wagner's reagent, or iodo-potassium iodide, always employed. This probable explanation of the reaction of the precipitation was verified by the authors in a quantitative investigation at some length.

The results of analysis of the periodides were found to be well sustained by constant results in volumetric estimation, the alkaloid to iodine factors calculated from the chemical formulæ of the periodides being used in every case for the volumetric work, with agreement quite satisfactory, as presented below. The calculation for each alkaloid was made upon its chemical formula, as given in a previous paragraph :

Ratio of alkaloid to 1 of iodine.	Total Iodine calc.	Total Iodine found.	Additive Iodine calc.	Additive Iodine found	Per cent. sol. made	Per cent. found by vol. anal.
Atropine, ...	79·74	79·48	70·88	70·98	0·50	0·47
0·2849		80·13		71·15	0·40	0·36
		79·62			0·30	0·28
Strychnine . . .	72·66	72·70	62·28	62.14	1·000	1·026
0·4390		72·54		62·34	1·612	0 633
Brucine	69·21	69·04	59·32	59·19	1·000	0·999
0·5179		79·04		59·37	0·5	0·497
Morphine . . .	64·03	63·80	48·02	48·29	0 518	0·525
0·74918		63·54		48·44	0·259	0·257
					0·100	0·105
Aconitine . . .	57 85	55·93	49·58	49·03		

In the case of atropine the authors obtained two mercuric iodides respectively $C_{17}H_{23}NO_3HI.HgI_2$ and $(C_{17}H_{23}NO_3HI)_2HgI_2$. They can be prepared by treating the periodide with metallic mercury, and in other ways described.

In the volumetric estimations, the iodine solution is made of decinormal strength, with sufficient potassium iodide and a corresponding strength of solution of sodium thiosulphate is used. To a known volume, constituting an excess of the iodine solution, a measured quantity of an aqueous salt solution of the alkaloid is added gradually; the mixture is shaken until the liquid becomes clear, when an aliquot part of all is filtered off and the excess of iodine determined by titrating with thiosulphate to an end reaction with starch.

The authors have elaborated a volumetric method of opium assay, upon the following plan: The opium alkaloids are set free by action of ammonia with certain solvents applied to the powdered opium. The free narcotine, paraverine, codeine and thebaine are then removed by percolation with benzene (bensol), after which the morphine is wholly taken out by percolation either with amyl alcohol or with acetone. Both these solvents have been used. The percolation is effected well by admixture of dry common salt with the opium powder. The solvent is evaporated from the percolate of morphine, and the residue taken up with lime water, whereby the alkaloid is purified from color and other extraneous matters. The filtered lime solution is acidulated, and the morphine in it estimated directly as periodide. One gramme of opium is quite sufficient, and two or more final titrations can be obtained from this quantity.

In the results of opium assay by this method, repeated operations give figures agreeing quite closely with each other. So far as com-

pared with the pharmacopœial assay, the results do not give lower percentages, but in some cases give higher percentages.

Other drug assay methods, with volumetric estimation of the alkaloid as periodide, are in progress of investigation.

So much of this article as relates to atropine was published in substance in *J. Am. Chem. Soc.*, for May, 1898, and the portion relating to opium assay was published in *Phar. Archives*, for June, 1898.

AROMATIC WATERS.[1]

By H. V. Arny.

Of the aromatic waters of the Pharmacopœia, six are directed to be prepared from volatile oil, with the aid of inert absorbent material, with the hope of creating greater solubility by minute subdivision of the oil.

That absorbent material is best adapted to this purpose has been a question of much discussion and uncertainty, and accordingly we see it changed in successive Pharmacopœias, from magnesium carbonate to absorbent cotton, and from the latter to precipitated calcium phosphate, which is the absorbent directed by the present Pharmacopœia. Hearing complaints from practical pharmacists, that the waters manufactured by the process of 1890 do not keep so well as those made by the absorbent cotton process of 1880—that they showed, in shorter time, the presence of microscopical organisms—the writer prepared in December, 1897, the six waters in question, by the processes of the two Pharmacopœias, and examined the same in July, 1898, seven months later.

The method of storing the samples was as nearly as possible that in vogue in a retail pharmacy; the waters being kept in 100 c.c. bottles filled to the shoulder, corked and capped with paper. At the same time, samples of each were placed in similar 100 c.c. bottles and stoppered with merely a plug of absorbent cotton.

After seven months' rest, each sample was examined, and whenever a precipitate had occurred (invariably a flocculent one, showing cellular structure under the microscope), it was collected on a tared filter and weighed, after being kept at the temperature of 100° for an hour.

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[1] Read before the American Pharmaceutical Association at the Baltimore meeting, September, 1898.

The following table shows the influence of time, not only as to quantity of microscopical growth, but also as to approximate strength of odor. Those marked *a* designate the water in corked bottles; *b* being those stoppered with cotton.

		Odor.	Precipitate in 100 c.c. (Expressed in milligrammes).
Anise,	1880 *a*.	strong.	none.
	1880 *b*.	faint.	none.
	1890 *a*.	strong.	0·5.
	1890 *b*.	faint.	none.
Camphor,	1880 *a*.	strong.	none.
	1880 *b*.	very faint.	1·4.
	1890 *a*.	medium.	0·6.
	1890 *b*.	very faint.	1·8.
Cinnamon,	1880 *a*.	strong and modified.	trace.
	1880 *b*.	faint.	none.
	1890 *a*.	medium.	none.
	1890 *b*.	faint.	none.
Fennel,	1880 *a*.	faint.	0·8.
	1880 *b*.	odorless.	none.
	1890 *a*.	medium.	1·3.
	1890 *b*.	odorless.	0·7.
Peppermint,	1880 *a*.	strong.	none.
	1880 *b*.	faint.	none.
	1890 *a*.	strong.	trace.
	1890 *b*.	very faint.	0·5.
Spearmint,	1880 *a*.	strong.	none.
	1880 *b*.	strong.	none.
	1890 *a*.	strong.	none.
	1890 *b*.	strong.	none.

As no attempt was made at sterilization of the waters, objection may be raised as to the scientific value of this data, yet, representing the normal treatment of these products in the ordinary pharmacy, we may glean some facts of possible value.

It will be first noticed that cinnamon, peppermint and spearmint waters are comparatively stable, the specimens of the last named being almost as fine after seven months as on the day they were made.

Again, we see that using a plug of cotton as a stopper, unless accompanied by sterilization, is worthless, and, even with the latter precaution, loss in strength is to be expected. Notice that in every case, save spearmint, the cotton-stoppered waters were either odorless or of faint odor.

Lastly, we find that, out of the eight samples containing appre-

ciable quantities of microscopical fungi, seven were made according to the method of 1890 and only one by the pharmacopœial process of 1880. Hence there seems some reason for the complaint that the waters made by the former process do not keep as well as those made by the latter method.

The expression of strength of samples by the terms "strong," "faint," etc., is so very vague that the writer endeavored to find a rational method of estimation of quantity of volatile oil in the waters under examination.

Owing to the complexity of the constitution of the several oils employed, any effort toward quantitative chemical estimation seemed useless, and the writer turned his attention to the physical separation of the oil from the water.

At first glance the process seems simple and easy. It is to extract the oil from the water by agitating with ether or other suitable solvent; but difficulty was encountered in attempts to separate the oil from the extraction solvent, owing to the tendency of volatile oils to spontaneous evaporation.

Taking a mixture of oil of peppermint and water (2 to 1,000) as a type, a large number of attempts at quantitative extraction were made. As solvents, ether, chloroform, benzin and rhigolene (B. P. 20° C.) were employed, and the separation of the oil from the solvent was attempted by evaporation between 30°–40°, spontaneous evaporation from various shaped vessels, evaporation in closed vessels, under gentle passage of a dried current of air, both at ordinary temperature and with refrigeration, and, lastly, suction, with the passage of the air over sulphuric acid.

All showed loss of oil save the process last mentioned, in which there was always excess of the theoretical weight, despite the total exclusion of moisture, with calcium chloride, soda-lime and sulphuric acid and the purification of solvents by redistillation and drying over exsiccated copper sulphate or metallic sodium, as occasion demanded. Accordingly, after several months' work, this line was reluctantly abandoned, and means of indirect estimation were sought.

In surveying the field of volatile oils, there is one which stands distinct by reason of its simple composition—one whose quantitative estimation is a matter of no great difficulty. This oil is that of gaultheria—methyl salicylate.

From this oil aromatic water was prepared by the calcium phosphate process directed for official waters of the Pharmacopœia of 1890, by the cotton process of 1880, the percolation being conducted at the rate of 30 drops a minute, by simple agitation of the oil with water at ordinary temperature for two days and subsequent filtration, and lastly by hot solution, the process being performed by heating the oil and water for fifteen minutes in a flask with upright condenser attached, the solution on cooling being filtered. This modification of the usual hot-water process is an improvement in that the shaking of a hot flask is obviated and that the loss of oil by evaporation is reduced to the minimum. In all the methods employed, the pharmacopœial ratio of oil and water (2 to 1,000) was followed.

The finished waters were assayed by the volumetric process of Simonson and Ewing (*Proc. A. Ph. A.*, 40, p. 196), modified by Kremers and James (*Ph. Rev.*, 16, p. 130), namely, saponification with a definite quantity of normal volumetric solution of potassium hydrate and titration of the excess of alkali with decinormal acid. The difference in quantity of alkali before and after saponification, represents the quantity used by the oil of wintergreen, and this, expressed in cubic centimetres of normal alkali, multiplied by the methyl salicylate factor, 0·152, gives the quantity of oil, in grammes, in the sample.

The result of these assays were as follows:

Process.	Quantity of Water used (C.C.).	Amount Normal Alkali used in Saponification (in C.C.).	Amount of Oil in Sample (in Grammes).	Percentage of Oil.
Calcium phosphate *a* . . .	50	0·23	0·03496	0·06992
b . . .	50	0·22	0·03344	0·06688
Cotton *a*	40	0·16	0·02432	0·0608
b	40	0·17	0·02584	0·0646
Agitation with water *a* . .	40	0·16	0·02432	0·0608
b . .	40	0·17	0·02584	0·0646
Hot water with upright condensation *a I* . . .	50	0·28	0·04256	0·08512
Hot water with upright condensation *a II* . . .	50	0·29	0·04408	0·08816
Hot water with upright condensation *b*	50	0·23	0·03496	0·06992

Samples *a* and *b* in each case are from different lots, and it will be seen that each pair agree fairly well, except the two batches

made by upright condensation, of which one sample contains about 0·07 per cent. of oil, and the other almost 0·09 per cent. This can be understood when it is stated that neither sample, despite repeated filtrations, were absolutely clear, and that sample *a* was a trifle more opalescent than sample *b*. In each case, control experiments were made, and the only deviation was in the assay of sample *a*, made by upright condensation, when between the two estimations there was a difference of $\frac{1}{10}$ c.c. decinormal solution, or a difference of 0·003 per cent.

Provided an aqueous solution of oil of gaultheria can be taken as typical of all aromatic waters, the following conclusions may be deduced:

(1) The quantity of oil actually dissolved by water is so small, that the various processes have but little advantage over each other on the score of strength.

(2) The cotton process yields a product no stronger than that made by simple agitation.

(3) Hot solution yields the most concentrated product, and even this, when absolutely clear, will be scarcely stronger than the calcium phosphate product.

CLEVELAND, O., August 6, 1898.

AN ADULTERATED GAMBOGE.

By J. F. Woolsey.

Gamboge is obtained in the market as block or mass, pipe and powdered; the powdered form being made from block and broken pipe. The latter, alone, will be considered.

As usually obtained, it is of a bright orange-yellow color, containing 70–80 per cent. resin, 3–4 per cent. ash, moisture 4–6 per cent., and gum. A good gamboge contains 75 per cent. resin. A trace of starch is usually found, but, owing to the method of collecting and packing, is not considered an adulteration.

Recently a lot of powdered drug was examined which was grossly adulterated. The color of the lot was more of a dull ochre than orange—scarcely noticeable unless compared with a good article.

Upon treatment with alcohol of 95 per cent., less than 40 per cent. was soluble, leaving over 50 per cent. undissolved on the filter. Starch or flour would seem to be the most natural adulterant, and

this appeared to be the case in this instance as evidenced by the large amount of starch indicated. In testing for this substance, the method of Eberhardt (AMER. JOUR. PHARM., 1896, p. 371) was employed, as it gives results not to be had by that of the Pharmacopœia.

ANALYTICAL DEPARTMENT OF
ELI LILLY & COMPANY, July 5, 1898.

VOLUMETRIC DETERMINATION OF FORMALDEHYDE.

The undersigned is indebted to Mr. Lyman F. Kebler, chemist for Smith, Kline & French Company, of Philadelphia, for calling his attention to an error in the method of calculating the per cent. of absolute formaldehyde from the result of titration, in a paper published in the February number of this JOURNAL. In several of the methods discussed, the quantities were so adjusted that the number of cubic centimetres of volumetric solution consumed, multiplied by 2, would indicate the per cent. of absolute formaldehyde present, each cubic centimetre being equivalent to 2·0 per cent. Through an inadvertent substitution of the process of division for that of multiplication, it was incorrectly stated that each cubic centimetre represented 0·5 per cent. of formaldehyde. The error occurs on page 88, line 19; page 90, line 12; and page 91, line 21. In each case *2·0* per cent. should be read instead of *0·5* per cent. This error does not affect any of the conclusions arrived at in the paper.

CARL E. SMITH.

PHILADELPHIA, PA., August 10, 1898.

GLEANINGS FROM THE MEDICAL JOURNALS.

BY CLEMENT B. LOWE, M.D.

THE RENEWAL OF PRESCRIPTIONS, ETC., IN GERMANY.

A recent decision of the Ministry of Public Worship, of Education and of Medical Affairs in Germany, is of interest. Prescriptions for internal use in Germany may not be repeated for the patient by an apothecary unless the physician signifies his approval in writing. External remedies, however, may be repeated. Substances prescribed as eye-washes, for inhalation, for subcutaneous injection, or for clysters and suppositories are, by this recent decision,

classed among internal remedies as regards their repetition, though the regulations as to bottles and labels that hold external remedies still apply to them.—*Phila. Med. Jour.*, July, 1898.

ANALYSES OF SAMPLES OF GROUND COFFEES.

Secretary Edge, of the Department of Agriculture, has recently received from Professor Cochrane a report of his analyses of a large number of samples of "ground coffee" and "ground coffee compounds," selected in Eastern Pennsylvania. The report, in part, is as follows:

"Composed of bran, cracked wheat and a little caramel; chiefly wheat bran, sweetened and roasted."

"Sample bears about the same relation to coffee as wheat screenings do to wheat."

"Roasted sweetened wheat, 75 per cent., coffee, 25 per cent."

"Composed of the roasted and rather finely broken grains of wheat and barley."

"Sample is composed chiefly of wheat bran."

"Composed of roasted cereals and husks of coca-beans."

"Coffee about 64 per cent.; pea hulls, 13 per cent.; and chicory, 23 per cent."

"Sample is roasted rye."

"Sample is roasted barley."

"Sample is composed of wheat, chicory, coffee and peas, coarsely ground."

"Composed of peas about 69 per cent.; grains, 29 per cent.; and chicory about 2 per cent."

"Sample is composed of bran, cracked wheat, chaff and caramel."

"Sample is composed of wheat, chicory, coffee and peas all coarsely ground."

Of all the samples examined, but four were found to be composed of pure coffee, and of these three were pronounced to be of "very inferior quality."—*Phila. Med. Jour.*, July 30, 1898.

ADULTERATION OF WHEAT FLOUR.

This seems to be a frequent and growing evil. When the adulterant employed is corn, this though an imposition on the public, is not harmful, and does not especially affect the food value of the product. The Maine Board of Agriculture has discovered that a busi-

ness concern is extensively advertising a substance called "mineraline," which is asserted to make the flour "whiter and nicer," and not to injure it in any way, and to be not at all injurious to health. It is supplied in various grades, from $8 to $20 per ton, and is asserted to net the dealer from $400 to $1,600 per car-load. Upon examination, mineraline is found to be ground soap-stone, a substance absolutely valueless as food, and whose use may be quite prejudicial to health.—*Phila. Med. Jour.*, July 23, 1898.

THE OLEANDER AS A DRUG.

In the *Indian Medical Record* for May 1st, Assistant Surgeon, H. D. Pant, of Gonda, reports a case of poisoning with the leaves of the oleander (Nerium odorum). A Mussulman coachman pounded seven leaves of the plant with water and sugar candy, and drank the sherbet, having been advised by a quack to take it as a diuretic for gonorrhœa. Severe vomiting set in, with violent retching and slight pain in the stomach. The pulse was extremely slow, only thirty-six to the minute, and feeble. The man recovered in the course of a day or two. The author likens the action of oleander on the heart to that of digitalis, and suggests the medicinal use of a mild tincture on account of its rapid action and its sustained effect.

NEW HOT-WATER BOTTLES.

The expensiveness and want of durability in the ordinary rubber bottles and ice-bags which have become so essential in the sick chamber, has long been a perplexing problem. Experiments with rice paper, covered inside and out with a coating of Japanese lacquer, led Professor Jacobsohn to recommend this material to the Berlin Society of Internal Medicine as far superior to rubber. In strength, flexibility, imperviousness, lightness and durability it leaves little to be desired.—*Med. News*, July 9, 1898.

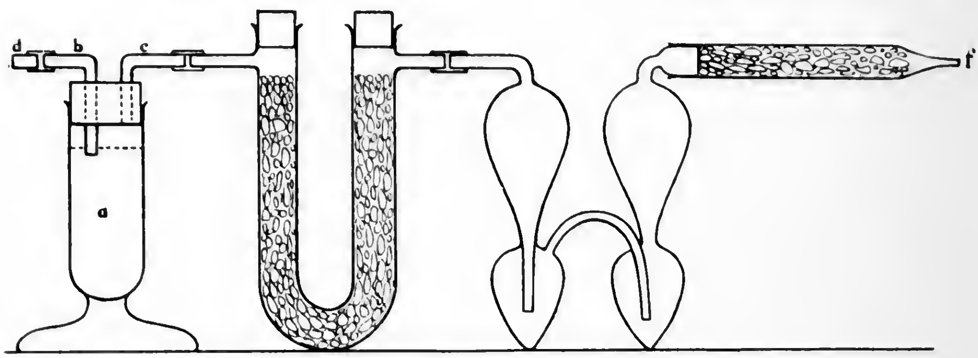
RECENT LITERATURE RELATING TO PHARMACY.

TESTS FOR ALBUMEN AND SUGAR IN URINE.

The following two tests—one a qualitative test for albumen in urine, the other a quantitative test for sugar—were lately proposed by Wm. C. Alpers, in a paper presented at the last meeting of the New York State Pharmaceutical Association.

The test for albumen consists in the use of mercury succinimide. The suspected urine is acidulated with hydrochloric acid, and an equal quantity of a 1 per cent. solution of mercury succinimide added, when, at the presence of albumen, the well-known white cloudiness will soon appear. This test is so sensitive that the presence of one part of albumen in 150,000 can be detected by it.

For the quantitative test for sugar, the following apparatus is constructed: A test-tube (*a*) on a foot, holding 50 to 60 c.c., is provided with a rubber stopper with two perforations; through one perforation a bent glass tube (*b*) is put, so that its lower end projects about an inch from the stopper, thus reaching into the fluid to be examined. Through the other perforation a similar glass tube (*c*) is put, whose lower end is even with the stopper. A quantity of urine is weighed into the apparatus, a piece of yeast added and



the stopper put on. The outlet at (*d*) is closed, and the tube (*c*) connected with a calcium-chloride tube and potash bulbs, such as are used in combustion analysis. The potash bulbs are weighed beforehand.

Fermentation soon begins, and the carbon dioxide generated by it rises in the tube and passes through (*c*) into the calcium tube and potash bulbs. After the reaction ceases (about eight to ten hours), the tube (*b*) is carefully pulled up until its lower end is just above the level of the liquid. Suction is then applied to the outer end (*f*) of the potash bulbs and the cap at (*d*) removed, so that a current of air will pass through the whole apparatus. Whatever carbon dioxide is still lingering in the apparatus is thus drawn into the potash bulbs, where it is dissolved, while all traces of moisture that may be carried along by the draft are absorbed in the calcium tube.

Finally, the bulbs are weighed again, and the increase in weight is the amount of carbon dioxide generated by the fermentation. From this the glucose can easily be calculated, by the following argument:

$$C_6H_{12}O_6 = 2C_2H_5OH + 2CO_2$$

Glucose.	Alcohol.	Carbon Dioxide.
(179·58)	(91·80)	(87·78)

Each 87·78 parts of carbon dioxide represent, therefore, 179·58 parts of glucose, or 1 part is the equivalent of 2·0458 parts of glucose. By multiplying the calculated weight of the carbon dioxide, therefore, by 2·0458, the exact amount of glucose contained in the urine under examination can be ascertained. From this the percentage, as well as the total amount of glucose passed in twenty-four hours, can easily be calculated.

A number of experiments made with this apparatus with solutions of glucose of known strength, showed that an almost absolute exactness is obtained.

PRESERVATION OF GRAPE JUICE.

The process of preparing unfermented grape juice is described by J. Craig (*Canada Expt. Farm's Rpts.*, 1896, p. 165), and sixteen experiments on the preservation of the juice are reported. The results indicate "that the natural flavor of the grape juice may be preserved intact by raising the temperature of the juice gradually to 170° F., keeping it at this point for ten minutes, and then quickly bottling it, taking care to use absolutely air-tight and thoroughly sterilized vessels. . . . The addition of sugar in the proportion of 4 ounces to each quart of liquid will improve the quality and palatability of the juice of the more acid varieties of grapes. . . . The use of antiseptics, such as salicylic acid, should not be encouraged."

CASHEW POISONING.

In an article by Williams in *Jour. Jamaica Agric. Soc.*, 1897, p. 319, on cashew (mesquite) poisoning, the author says that when animals are fed with this legume (*Prosopis juliflora*) they become slick, glossy, and look well. The animals seem very fond of it. But when it is damaged by rains, heavy dews, etc., it is poisonous. Animals that eat it when it is in the poisonous condition become

distended with gas, and rupture of the digestive system may result. Clots of blood have been found in the cerebellum. The first symptoms are colicky pains with abdominal distension ; the animal paws, lies down and rises frequently, and shows an inclination to thrust its head into corners. It may lie on its back with feet doubled up and groan with pain. Cold sweats occur, breathing becomes thick and labored, and there are frequent attempts at micturition. Urine is voided in small quantities. The remedy is puncturing the abdomen and drawing off the gases, together with hot fomentations to abdomen and loins, and the administration of oil and hot-water enemas. The animal may finally die from collapse.

PECTIN OF GENTIAN.

Bourquelot and Hérissey have succeeded in isolating the pectin of gentian. They exhaust the drug with alcohol, removing the alcohol and dissolving the residue in ten times its volume of water in an autoclave (110°). The pectin is obtained from the latter by precipitation with alcohol containing hydrochloric acid. The precipitate, purified by washing with alcohol and then ether, and dried, is soluble 1 part in 100 of water, and is easily oxidized by nitric acid to mucic acid.—*Jour. Pharm. Chim.*, 1898, p. 8 ; abs. in *Pharm. Zeit.*, 1898, p. 339.

Poisoning by Insect Powder.—A child, eleven months old, got a lot of the powder in the mouth, nose and eyes. The pulse became weak, the breathing reduced, cramps and vomiting were produced. The child recovered upon being given an emetic.—*Apoth. Zeit.*, 1898, p. 393.

High Specific Gravity of Urine.—M. D. Hodge reports in the Virginia Medical Semi-monthly (1898, p. 99), the case of a patient whose urine had a specific gravity of 1·120. The amount of chlorides was 3·9 per cent. by weight. On inquiry it was found that the woman ate largely of salt pork, ham, mackerel and seasoned her other food with a considerable amount of salt. She rarely drank water, but used tea and coffee.

Adulteration of Coffee with Sugar.—In his quarterly report to the Chester County Council the public analyst states that he examined a sample of coffee which contained an excess of sugar. This he said was due to a practice of roasting coffee with a certain proportion of sugar, which would increase the weight of coffee from 5 to 10 per cent. This admixture was so skillfully done that each berry was coated with the sugar, and any one buying such coffee in the berry would think he was obtaining it pure. It was an innocent and at the same time profitable adulteration, sugar costing a penny a pound was sold at the rate of one shilling or more.—*Brit. and Col. Drug.*, 1898, p. 739.

EDITORIAL.

ANNUAL CONVENTIONS.

It is noticeable this year that many of the conferences of large scientific bodies have been in our large cities. In America the American Association for Advancement of Science met in historic Boston, August 22–27; the American Pharmaceutical Association met during August 29th–September 3d in Baltimore, a great commercial and manufacturing city. Abroad we find that the British Pharmaceutical Conference was held at Belfast, a city which vies with any in Great Britain in enterprise and self-reliance; and the Third International Congress of Applied Sciences met in the Austrian Capitol, Vienna.

Conventions held in large cities are, as a rule, no doubt better attended and the results possibly extend further than those held elsewhere. The large cities have certain advantages and possibly disadvantages at this time of the year for the holding of large conventions. There are increased accommodations and attractions, and, as a rule, in or near large cities are the prominent educational institutions, museums, and art galleries, and near to them are other places of interest and pleasure. In a recreative sense a far greater number can have their individual tastes satisfied in those meetings that are held in large cities than when the same are held in smaller towns. At the Boston meeting of the American Association for the Advancement of Science, see what the sail by boat to historic Salem, the day at Cambridge, etc., meant to the members. Then, too, all of the other treasures and avenues of pleasure in Boston were open to those who chose to avail themselves of them. At the American Pharmaceutical Association there were equally as attractive excursions; as the all-day ride on the Chesapeake, including visit to Naval Academy and historical rooms of the State House at Annapolis; the carriage ride through Druid Park, noted the world over for striking natural scenery; the trip to Washington, Mt. Vernon, and to Johns Hopkins University—all of these excursions were very profitable and pleasurable both at the same time.

These scientific conventions are the meetings that ought to draw the man fresh from college. If his hopes and aspirations are directed for a greater knowledge and broader education, he ought to journey so soon as he can to conventions of his calling. The local and national meetings will be a source of greater profit intellectually, physically and morally, and cause his life-work to assume a truer purpose and greater usefulness than anything else he can do. To-day it is necessary for progressive men and women to be affiliated with the various organizations of their profession. The President of the British Pharmaceutical Conference, Dr. Symes, truly said that the value of these conferences to the qualified man are that they indicate "that there is no finality to his knowledge; that he has merely entered by the legitimate portal into the field of applied science, investigation and research; it offers him encouragement to devote himself more closely to the higher branches of his calling, and thus not only give deeper interest to it, but to sweeten the labor and drudgery attendant on the more commonplace matters which go to make up the daily round of duty."

The President of the American Pharmaceutical Association attested in a more personal way to the value of this Association to him. He says: "The American Pharmaceutical Association is to me one of the most delightful, attractive

and helpful organizations that I have ever been connected with. It has not been my privilege to attend all of the annual meetings, but when present, I realize how much I have lost by absence. . . . While as a member I rejoice in the personal advantages secured, I must extend my sympathy to those who are not members, and my regret that so many of our craft are blindly or foolishly neglecting and rejecting, dividends larger and better in every way than can possibly be secured by any other investment of time and money.

Some of the benefits that accrue in attending these conventions in an intellectual sense are that :

(1) They direct and stimulate one's thoughts and energies upon questions of scientific interest as well as practical benefit.

(2) They are of direct and immediate benefit to the investigator, in that the discussions upon the results of his labors enable him to perfect these investigations as well as to disseminate the results.

(3) The few days of relaxation and time for thought and contact with others ofttimes saves the thinking man much labor and directs his energies along the most profitable lines.

(4) To the student fresh from college they serve to arouse aspirations and ambitions which admirably supplement the college training and make him to feel that he is in the larger school during all the remainder of his days of life.

The practical pharmacist will find that affiliation with and attendance at his local, State and National Associations are necessary if he wishes to possess the exalted title of a "practical" pharmacist.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

ATLAS DER OFFICINELLEN PFLANZEN.—Darstellung und Beschreibung der im Arzneibuch für das deutsche Reich erwähnten Gewächse. Zweite Verbesserte Auflage von Darstellung und Beschreibung sämmtlicher in der Pharmacopœia Borussica aufgeführten Officinellen Gewächse von Dr. O. C. Berg und C. F. Schmidt. Herausgegeben durch Dr. Arthur Meyer und Dr. K. Schumann. Lief. xxii ; Tafel cxxiv–cxxix.

In this number of the Atlas are contained monographs on *Sassafras officinale*, Th. Fr. L. Nees. u. Eberm.; *Laurus nobilis*, L ; *Beta vulgaris*, Linn., *var. Rapa* Dumort ; *Cubeba officinalis*, Miq., and *Cannabis sativa*, Linn. Excellent illustrations of the outer morphology of these plants accompany the articles.

VIII CONGRÈS INTERNATIONAL DE PHARMACIE ET DES SCIENCES QUI S'Y RATTACHENT TENU À BRUXELLES LES 14, 15, 16, 17, 18 et 19 AOUT, 1897.—*Compte Rendu*, par M. Duyk, Secrétaire-général.

An account of the Eighth International Pharmaceutical Congress has already been given in this JOURNAL (1897, p. 464). The present publication gives a detailed account, in some 571 pages, of the proceedings, together with a list of members, officers, etc.

ALKALOIDAL ESTIMATION.—A bibliographical Index of the Chemical Research prepared from original Literature for the Committee of Revision. By Paul I. Murrill, under the direction of Albert B. Prescott. Published by the

Committee of Revision of the Pharmacopœia of the United States of America: 1890–1900.

The object of this work is to furnish a descriptive index of the work that has been done on the estimation of alkaloids, rather than to abstract or summarize it. References to republications and abstracts as well as to the original publication are given.

BEITRAG ZUR KENNTUISS DER FLECHTEN UND IHRER CHARATKERISTISCHEN BESTANDTHEILE.—Von O. Hesse. (Erste Mittheilung.) Separat-Abdruck aus dem *Journal für praktische Chemie.* Neue Folge, Band 57. 1898.

The author has obtained a large number of compounds from different species of Cetraria, Cladonia, Darbishirella, Dendographa, Evernia, Roccellaria, Reinkella, Ramalina, Roccella and Usnea. For the extraction of these various lichens Hesse employed ether. He obtained the following compounds: Usnic acid, $C_{18}H_{16}O_7$, the M. P. of which is 196°. Barbatinic acid, for which Stenhouse and Groves gave the formula $C_{19}H_{20}O_7$, but which Hesse finds to be $C_{22}H_{24}O_8$, and M. P. 186°. Usnaric acid ($C_{30}H_{22}O_{15}$), upon heating, becomes brown and black, and does not melt at 260°. Usnarin has the M. P. 180°. Vulpinic acid has the formula $C_{19}H_{14}O_5$. Divaricatic acid has the formula $C_{22}H_{26}O_7$, and M. P. 129°. Evernic acid has the formula $C_{17}H_{16}O_7$, and M. P. 168–169°; on heating with barium hydrate, it yields orcin, and at 158°, evernic acid ($C_9H_{10}O_4$). Ramalic acid has the formula $C_{17}H_{16}O_7$, and M. P. 179°, and yields, with barium salts, the same products as evernic acid. Erythrin has the formula $C_{20}H_{22}O_{10} + H_2O$, and it does not lose the molecule of water at 137°, but at 148°. Oxyrocellic acid has the formula $C_{17}H_{32}O_5$, and M. P. 128°. Rocellic acid has the formula $C_{17}H_{32}O_4$, and M. P. 129–130°. Lecanoric acid has the formula $C_{16}H_{14}O_7$, becomes anhydrous at 166°, melts, and, upon cooling, its solution with glacial acetic acid changes entirely into Orsellinic acid. Rocellaric acid forms beautiful needles, melting at 110°. Rangiformic acid has the formula, according to Hesse, of $C_{21}H_{36}O_6$, contrary to Paterno, who gave the formula as $C_{11}H_{18}O_3$. This acid melts at 102°, and, upon heating with hydrochloric acid at 119°, yields Norrangiformic acid ($C_{20}H_{34}O_6$). Atranorin is not an acid, as Paterno and Oglialora designated it, viz., as Atranoric acid. The formula of Atranorin is $C_{19}H_{18}O_8$; M. P. is 187–188°, decomposing at this temperature also. On heating Atranorin with glacial acetic acid in a tube at 150°, it yields Physicol, having the formula $C_7H_8O_3$, and M. P. 104–105°, and an ester ($C_{10}H_{12}O_4$), which is identical with Physcianin, Atraric acid and Ceratophyllin. On treating Atranorin with alcohols an acid, called by Hesse Hämatommic acid ($C_8H_7O_3.COOH$), is obtained. Atranorinic acid has the formula $C_{18}H_{18}O_9$, and M. P. 157°. Protocetraric acid has the formula $C_{30}H_{22}O_{15} + H_{20}$. On heating alone, it does not melt, but becomes uniformly blackish, and on heating with alkalies and alkali carbonates, yields Fumaric acid and bitter Cetrarsäure, $C_{26}H_{20}O_{12}$. Lichesterinic acid has the formula $C_{17}H_{28}O_4$, and M. P. 109–110° (not 120°, as previously given). Chrysocetraric acid forms beautiful golden-yellow shining plates and needles, the formula of which is $C_{19}H_{14}O_6$, M. P. 196–198°, and on heating with barium hydrate and water, yields oxypulvinic acid ($C_{18}H_{12}O_6$).

PRINCIPAL POISONOUS PLANTS OF THE UNITED STATES. By V. K. Chestnut. Washington: Government Printing Office.

In the annual report of the Botanist for 1894 was emphasized the importance

of doing something to lessen the increasing number of fatal cases of poisoning due to carelessness or to a lack of correct knowledge of our poisonous plants, and as a result the Secretary of Agriculture, in November, 1894, appointed Mr. V. K. Chestnut as an assistant in the Division of Botany, to take charge of such a line of work. In addition to the chemical and physiological investigations which have since been in progress, it has seemed desirable to distribute at once some simple but authoritative account of our commonest poisonous plants. In the prosecution of this work a novel method of securing correct information about actual cases of poisoning has been adopted. Through newspaper clipping bureaus the Division of Botany receives notices of all the cases of poisoning that are recorded in the principal newspapers. Then, through the persons mentioned by name in these articles or turough the local postmaster, they get into correspondence with the physician in charge of the case, secure a specimen of the plant which is responsible for the poisoning, and place on file a complete record of the symptoms, treatment and results. By this means they have secured a large amount of authentic and valuable information, additional to the published statements, the partial benefit of which is given to the people in this publication, and the remainder of which will be used from time to time in more detailed publications on the poisonous qualities of particular plants.

The plants which have been considered, about fifty in number, include most of the important poisonous species. Each is illustrated, wherever necessary, by an original drawing from authentic specimens, and is briefly described in a popular way. This, together with the liberal use of common names and a brief outline of the geographical distribution, will doubtless enable individuals in different localities to recognize any of the plants.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The fiftieth anniversary of the American Association for the Advancement of Science was held in Boston, August 22 to 27, 1898. This year the Association held its meeting also in the place of its birth, for it was in Boston, in 1848, that the American Association met for the first time, being really the outcome of the American Association of Geologists and Naturalists. The organization to-day is divided into nine sections.

On Monday morning, August 22d, at 10 o'clock, the meeting was formally opened in Huntington Hall. On the platform was a large and distinguished company, including not only well-known scientists from home and abroad, but also the Governor of the Commonwealth, the Mayor of the city, the Bishop of the Diocese and other clergymen. From abroad were Prof. Désiré Charnay, of Paris; Dr. A. Sasse, of Zaandam, Holland; Prof. Benjamin Howard and Mr. Conrad W. Cooke, of London.

The meeting was called to order by Prof. Wolcott Gibbs, the retiring President. At his request Bishop William Lawrence, of the Diocese of Massachusetts, offered prayer. Professor Gibbs then introduced Governor Wolcott, to extend the greetings of the Commonwealth.

Mayor Gurney and President J. M. Crafts, of the Massachusetts Institute of Technology also made brief addresses.

The president-elect, F. W. Putnam, of Harvard University, was introduced by the retiring president, and made a brief address.

Professor Désiré Charnay was introduced and he spoke briefly in French. A message was read from the Russian Geological Committee of St. Petersburg, sending to the American Association respectful congratulations and good wishes. After listening to announcements of meetings to be held, invitations to partake of the hospitalities of societies and clubs, and other matters of detail, the Association adjourned until 2.30 o'clock in the afternoon.

In the afternoon the vice-presidents of the various Sections gave their annual addresses. Among which may be mentioned that by Dr. Whitman, "On the Perception of Light and Color;" Dr. Farlow, on "The Conception of Species as Affected by the Recent Investigations on Fungi;" Dr. Smith, on "The Electrical Current in Organic Chemistry;" etc.

In the evening the retiring president, Wolcott Gibbs, gave the annual address, the topic being, "On Some Points in Theoretical Chemistry."

On Tuesday the Sections met at 10 A.M. and 2 P.M. to hear the reading of scientific papers. The amount of work accomplished at this meeting was enormous, as on this day alone, a total of 278 papers were presented, making an average of thirty-one for each of the nine Sections. The topics and treatment were eminently scientific and it is doubtful if the Association ever had the pleasure of a larger attendance of enthusiastic scientists and more numerous technical and scientific papers were ever presented. Among the botanists, the foremost exponents of cytology discussed their recent labors; the morphologist and ecologist met with the systematist, and all contributed valuable papers. Not only was there a harmony and a union in the Botanical Section, but in all the Sections, and some idea of the nature of the problems considered may be gleaned by giving abstracts of a few of the papers presented by some of the Sections.

In a paper on "The Ripening of Cheese" S. M. Babcock and H. D. Russell stated that it has heretofore been supposed that the process was aided by the action of bacteria. The authors were unable to account for the many discrepancies which occurred in the process, by explaining them as caused by bacterial action. They added mild antiseptics, such as ether and chloroform to the milk, which would stop the action of bacteria. Such milk underwent changes similar to those that occur in cheese. From these it was evident that the bacteria were not the agents causing the ripening of cheese, but it is probable that the milk contains an unorganized ferment capable of digesting casein. They gave the name of galactase to the ferment.

Dr. G. Frederick Wright described a newly discovered Strontian cave at Put-in-Bay, O. Strontium does not occur native, but is found chiefly as sulphate. This forms crystals of a delicate blue color. These crystals occur in many places in Europe; but the principal locality in America from which museums have been supplied with specimens is Strontian Island, two or three miles from Put-in-Bay Island, in the western end of Lake Erie. But just as this supply was becoming exhausted, a remarkable fissure was discovered last winter on Put-in-Bay Island, which is completely surrounded with very large crystals of this beautiful mineral. The fissure was penetrated in digging a well seventeen feet below the surface, and is large enough to permit the entrance of ten or twelve people at a time. It is not an ordinary cavern, but apparently is the interior of an immense "geode" lined with crystals of this mineral.

The social and recreative features of the meeting were well arranged and of great interest and profit. Wednesday was Salem Day. The scientists took the train or steamer to Salem and were the guests of the Essex Institute. Here the local committee served the party with an old-fashioned New England shore dinner, after which the ancient landmarks of this historic city were visited. On Friday Harvard University did the honors for the visiting scientists, and gave the members of the American Association every opportunity for looking over the treasures contained in the University libraries and museums, as well as for familiarizing themselves by first-hand inspection with the methods and facilities for work in all the various departments of the institution.

On Saturday, August 27th, after five days of work and pleasure, the American Association for the Advancement of Science closed the sessions of its convention. The convention itself has been highly successful as well as important. Papers read have been of exceptional value, and many discoveries of interest to the scientific world have been brought to light. In many cases these discoveries have been the result of years of patient research. Equally important are the suggestions that have been made, and the fruit of them will be seen at next year's meeting at Columbus, O., where the Association will meet. Professor Edward Orton, State Geologist of Ohio, was selected as President for 1899.

During the Association week, and the days immediately preceding, a number of affiliated societies met in Boston, including the American Forestry Association, the Geological Society of America, the American Chemical Society, the Association of Economic Entomologists, the Society for the Promotion of Engineering Education, the Society for the Promotion of Agricultural Science, the American Mathematical Society, the National Geographic Society, the American Folk Lore Society, the Botanical Society of America, and several other important bodies.

THIRD INTERNATIONAL CONGRESS OF APPLIED CHEMISTRY.

The Third International Congress of Applied Chemistry met in Vienna July 27–August 2, 1898. After the various addresses by the President of the Congress, Honorary President of the Organization Committee and others, and the election of the Honorary President and Vice-presidents of the Congress, Professor Buchner gave his address on Fermentation without Yeast Cells. For the information of this Congress we are indebted to the *Chemiker Zeitung* (August numbers) and *Brit. and Col. Drug.*, August 19, 1898. Büchner previously published his work in the early part of the present year on alcoholic fermentation. He obtained a liquor, called zymase, from yeast cells, which is capable of starting the alcoholic fermentation of sugar. So that he has here the product of a living organism, and not the organism that is the cause of fermentation. The labors of Büchner would tend to re-establish the now discarded theory of Liebig, that fermentation is a purely chemical process. This zymase is only obtained on subjecting yeast cells to a hydraulic pressure of more than 500 atmospheres, and then it is as an expressed liquor containing this fermenting substance. In concluding his admirable address the speaker said "it must be left to the future to define the exact boundary between living plasma and a fermentive substance, between the highest representatives of inorganic nature and the most rudimentary and elementary form of organic life."

Dr. Lilienfeld has produced, artificially, peptone, a compound which has hitherto been supposed could only be produced by organic life. It is produced by means of the condensation of phenol and amido-acetic acid with the oxychloride of phosphorous. The author prepared at the convention the artificial albumen and demonstrated, so far as chemical tests could prove, their identity.

In the Pharmaceutical Section, Kremel, of Vienna, delivered an address upon the subject, "That drugs of a powerfully active nature should not only in different countries be prepared from the same formulæ, but that the accurate quantity of the active principles contained in the same should be determined in all countries by one and the same method." After a discussion the following resolution, which was carried, was presented by Kremel, viz.: "The members of Section II (Pharmacy) of the International Congress for Applied Chemistry, are of the opinion that it is a question of urgent necessity that the powerfully operating preparations of all pharmacopœias should contain a uniform quantity of the active principles, and that this uniformity should be attained by the employment of identical methods of preparation." As a general rule, they recommend for extracts, tinctures and drugs the use of such testing formulæ as are based upon the method of agitation and subsequent titration with $\frac{n}{100}$ of acid, as employed by Schweissinger, Sarkow, Beckurts and Keller. For the determination of morphine the method of Welfenberger in its most recent form is recommended.

BRITISH PHARMACEUTICAL CONFERENCE.

The British Pharmaceutical Conference met for the second time in its history, in Ireland, on August 9th, 10th and 11th. The first visit being in Dublin, in 1878, the second in 1898, in Belfast. The Presidential address was given by Charles Symes, and represented a rather comprehensive survey of the numerous problems which have of late years troubled the pharmacists of Great Britain in a greater or lesser degree. We are indebted to the *Pharmaceutical Journal*, August 13, 1898, for the account of this address and the principal scientific papers of which we give abstracts in this issue. Dr. Symes regards education as the first and foremost factor in the general advancement of the craft. Regarding examinations he stated that it was his experience that the majority of men, when just fresh from their examinations, are then only in a position to learn how to expand, apply, and increase their knowledge for the efficient performance of their duties. This does not apply to pharmacy alone; indeed, so much did it apply to the medical student that some few years ago, the curriculum was extended to include one year of practical application of the knowledge possessed before registration, by the Medical Council.

The reminder that pharmacists are directly interested in the operation of many Acts of Parliament that do not concern the ordinary individual is a timely one, for every member of the craft should consider it incumbent upon him to possess an acquaintance with certain provisions of all the statutes mentioned by Dr. Symes and of one or two others. But, unfortunately, too few have even taken the trouble to acquire a definite knowledge of the Pharmacy Acts, and it is not surprising, therefore, that chemists and druggists are

continually finding themselves at a disadvantage because of their ignorance of the exact bearing of some statute or another upon their business. The Poisonous Substances Bill, recently deceased, naturally came under review in the address, Dr. Symes being strongly of opinion that it is impracticable for a Government department "to legislate for matters which really belong to pharmacy." That is a pretty common view in pharmaceutical circles, but in view of the probability of the objectionable measure being resuscitated next session, attention cannot too often be directed to the fact.

The metric system and the difficulties attending its general use were briefly referred to, and pharmacists urged to familiarize themselves with the system, so that they may help to forward its universal adoption. Allusion was also made to the special regulations bearing on the sale of calcium carbide and methylated spirit, the restrictions in connection with the latter being held to be unnecessarily severe and tending to operate in restraint of trade. Synthetic compounds used in medicine and for industrial purposes were then referred to at some length, after which attention was devoted to the new British Pharmacopœia. Dr. Symes reiterated his oft-repeated objection to the constitution of the British Pharmacopœia Committee of the General Medical Council, protesting against the exclusion of pharmacists from that body when the bulk of the work of revision must of necessity be done by pharmacists.

THE BASICITY OF QUININE.

By David Howard and D. Lloyd Howard.

The authors stated that everything points to the conclusion that in the alkaloid each of the nitrogen atoms of the molecule represents a basic nucleus, one of which is much more powerful than the other. This is shown by the action of ethyl or methyl iodide or bromide, which very readily give a monethyl or monomethyl base, and with more difficulty a diethyl or dimethyl base. The formation of quinine salts points to the same conclusion. Sulphuric acid will form three definite crystalline salts; one molecule combining with two molecules of quinine to form the ordinary sulphate of quinine of commerce, with one molecule to form the "soluble sulphate" of commerce; or two molecules of acid will combine with one molecule of quinine to form the little known "tetrasulphate." Similarly the monobasic acids, hydrochloric, hydrobromic, and hydriodic form definite crystalline salts with both one and with two molecules of acid to one of the alkaloid.

Whether the "soluble sulphate" should be regarded as forming a hydric sulphate of the stronger basic nucleus or a neutral sulphate of the "diammonium" must be a matter of opinion; but the tetrasulphate and the acid halogen salts can hardly be regarded otherwise than as the hydric sulphate or the haloid salt of the fully saturated base.

The French chemists have always consistently regarded the "soluble sulphate" as the "neutral sulphate" and the sulphate of commerce as the "disulphate," and similarly they speak of the soluble hydrochlorate as the "neutral" salt and the ordinary hydrochlorate as "basic."

The nomenclature frequently leads to confusion. A disulphate is supposed to be identical with a bisulphate instead of being a basic sulphate, and the exact opposite of a bisulphate.

With litmus as an indicator the point of the formation of the older official

salts is very well defined, the reaction is almost as well marked as in the case of the formation of the neutral salt of an alkali, and thus as far as indicators go, the sulphate of quinine of the British, American, German, and most other Pharmacopœias is undoubtedly a neutral salt. No indicator appears to show the formation of the soluble salt with any degree of certainty.

The effect of sulphuric acid in increasing the specific rotation of polarized light by solutions of quinine, also point to a marked difference in the constitution of the different sulphates. From the labors of Hesse the maximum rotation is not reached immediately on the addition of the excess of acid, but only after a lapse of some time, pointing to a slow formation of the tetrasulphate in the comparatively dilute solutions used.

Whatever theoretic conclusions we may form as to the composition of the salts of quinine, there is no doubt of the convenience of the nomenclature adopted by the British, German, American, Dutch, and most other Pharmacopœias, which regards the familiar sulphate as neutral and the soluble sulphate as a bisulphate, but in foreign commerce we must always be on our guard against confusion arising from the French nomenclature, to guard against which the Italian Pharmacopœia gives us the following remarkable trio of synonyms: Bisolfato de chinino = solfato acido de chinino = solphato neutro de chinino.

NOTES ON FERRUM REDACTUM, P.B., 1898.

By E. Saville Peck.

The author examined some fifteen samples collected from different sources—wholesale houses, pharmacists, hospitals and drug stores. From the subjoined table (*B*) it will be seen that, with few exceptions, the more silvery-gray the sample, the more free metallic iron it contained. The brown masses mentioned consisted chiefly of ferric oxide (F_2O_3).

When treated with hydrochloric acid all samples left a variable residue of carbon and $Si\ O_2$. Hydrogen was liberated having an odor of carburetted hydrogen or an olefine. This liberated hydrogen when passed into lead acetate solution gave a black coloration, due to lead sulphate according to the sulphur present.

Nine out of the twelve samples contained arsenic. Five of the samples gave distinctly alkaline reaction. The following table indicates the difference in the results obtained by the copper sulphate (P.B., 1898) and the mercuric chloride (U.S.P., 1890) methods for the estimation of ferrum redactum:

Sample.	Percentage of Iron by Copper Sulphate Method, P.B., 1898.	Percentage of Iron by Mercuric Chloride Method, U.S.A., 1890.	Percentage. Average Difference.
X 1	91·68	85·65	6·18
2	92·06	85·74	
Y 1	60·13	41·19	19·40
2	60·65	41·79	
Z 1	41·91	31·16	10·29
2	41·66	31·82	

It was found that the solution of copper sulphate (as is invariably the case) gave an acid reaction with litmus paper, and it is conceivable that this acid

TABLE B.—QUALITATIVE AND QUANTITATIVE ANALYSIS OF TWELVE SAMPLES OF COMMERCIAL FERRUM REDACTUM.

Sample.	General appearance.	Wt. taken for analysis.	Free Fe found.	Per cent. of do.	Sulphides indicated by smell.	Sulphides indicated by lead acetate paper.	Arsenic.	Insol. matter, such as silica and carbon.	Test with litmus paper.
A	Silvery-grey, slight lustre	·2345	·2080	88·67	Nil	Faint trace	Faint trace	Present	Nil
B	Grey with brown masses	·3575	·2599	72·71	Slight smell	Traces	Traces	"	Faintly alkaline
C	Silvery-grey with brown masses	·2165	·166	76·74	Nil	Traces	Faint traces	"	Nil
D	Grey with brown masses	·2515	·2117	84.18	Nil	Traces	Absent	"	Strongly alkaline
E	Black cakes	·326	·201	61·65	Distinct smell	Traces	Traces	"	Nil
F	Chocolate-black	·3385	·141	41·66	Distinct smell	Traces	Slight traces	"	Nil
G	Silvery-grey with brown masses	·606	·4073	67·22	Distinct smell	Slight trace	Faint traces	"	Nil
H	Black	·142	·1013	71·34	Strong smell	Heavy traces	Faint traces	"	Strongly alkaline
I	Black	·255	·170	66·69	Strong smell	Heavy traces	Faint traces	"	Strongly alkaline
J	Silvery-grey with few masses	·342	·2605	76·16	Nil	Faint trace	Absent	"	Nil
K	Dark grey	·8255	·3939	47·72	Nil	Traces	Faint traces	"	Nil
L	Chocolate-grey	·625	·552	88·33	Nil	Faint traces	Absent	"	Alkaline

formed with the ferrous oxide (FeO) frequently present in black samples, such as Y, ferrous sulphate, and so tended to give a higher reading than the correct one. On the other hand, in the mercuric chloride method, the presence of mercurous chloride may have a deterrent effect upon the oxidizing action of mercuric chloride upon the free iron present, and so tend to lower the reading.

NOTES ON "CONCENTRATED OIL OF LEMON."

By T. H. W. Idris.

According to the author, "concentrated oil of lemon" is a misnomer, as the terpene of the ordinary oil has a flavor and pungency which are peculiar to itself. Some "concentrated soluble essence of lemon" has been found to consist simply of oil of lemon to which alcohol has been added. Other samples contain added lemon-grass oil or citral, or an admixture of ethers with the oils of lime and orange. Such mixtures are of but little value to mineral water manufacturers, but "terpeneless" oils are of decided utility. Those oils differ considerably, however, and the author of this paper shows how the aldehydes in oil of lemon can be separated without much change and in a state of comparative purity by fractional distillation under reduced pressure. After distilling off about 90 per cent. below 100° C., an oily liquid is left, which deposits a white sediment on cooling. By passing steam through this residue, a pale yellow oil is carried over, which possesses, to a very marked degree, the pure lemon aroma and is very different from citral.

THE GALENICAL PHARMACY OF THE 1898 PHARMACOPŒIA.

By F. C. J. Bird.

The author gives a cursory glance at the more important classes of galenicals of the new B.P., and indicates the direction in which they have been affected by official alterations. The paper is an extremely useful contribution to the literature of the subject of which it treats, and seeks to elicit the experience and views of other workers from the practical retail pharmacist's standpoint, and will serve as an excellent introduction to the general discussion of the new British Pharmacopœia. Under *extracts* Mr. Bird states that the new and altered extracts are, on the whole, a greatly improved class of preparations. Marked improvements are noted in the following liquid extracts: Cascara sagrada, Belladonna, Glycyrrhiza, etc. The more frequent instruction to "evaporate to dryness," and the introduction of extracts reduced to powder with sugar of milk, is noted as a distinct advance in the direction of uniformity, for, in these cases, the operator is now relieved of all doubt as to the meaning of such indefinite expressions as "suitable consistence," "consistence for forming pills," "soft extract," etc., which were of common occurrence in the last Pharmacopœia.

The insertion of liquors marks a change in the official attitude which, by many, has long been regarded as inevitable, for they are introduced as the result of many experiments made with the object of preparing decoctions and infusions in a highly concentrated state, which should resemble the liquids termed by manufacturers "concentrated infusions and decoctions." The methods given for the preparation of these liquors, although perhaps not so perfect as those followed commercially in the manufacture of concentrated in

fusions, are, on the whole, successful, the Liquors Sarsæ Co., Senegæ and Quassiæ being amongst the best.

The process for Spiritus Ætheris Co. involves the distillation of a mixture of alcohol and sulphuric acid at a high temperature, which few pharmacists are in a position to do without risk. In making Spiritus Ætheris Nitrosi, the deficiency of product, due to the loss of nitrous ether in the old process, is now avoided by placing a portion of the alcohol in the receiver to absorb any ethereal vapor which may have escaped condensation.

Mr. Bird does not share the regret with which the disappearance of proof spirit has been viewed in some quarters. He says so long as the word "proof" remained on the official page, there was always an inducement to use it as a standard of alcoholic strength, but its removal has cleared the way for the more rational, scientific and infinitely more convenient centesimal system now happily adopted. Long custom and daily contact with the proof standard have rendered it indispensable to the British Excise, but for pharmaceutical purposes the new method of expressing alcoholic strength has all those advantages over the old, which metric weights possess when compared with avoirdupois weights. Keen disappointment has been felt at the absence of Syr. Ferri Phosph. Co. and Syr. Hypophosph. Co. These two syrups are manufactured in enormous quantities, but as all makers do not follow the B.P.C. Formulary, there is great variation, and authoritative processes for their preparation were eminently desirable.

The new and altered formulæ of the tinctures have, from a laboratory point of view, proved in most cases entirely satisfactory. The objection that has been raised to the use of fresh peel in making Tinctura Aurantii, viz.: that it can only be obtained at a certain season of the year can hardly have much weight when it is remembered that many other official drugs (poppy petals, green herbs, etc.) labor under the same disadvantage. Among ointments many improvements have been effected. Experience in the use of the paraffin basis, inaugurated in the last Pharmacopœia, has had its effect on the present formulæ, and, generally, they may all be said to be highly satisfactory. The assay processes of the new Pharmacopœia have been found to work well in the analytical laboratory. The one for morphine is now trustworthy and free from error.

GREEN EXTRACTS OF THE PHARMACOPŒIA.

By W. A. H. Naylor and John J. Bryant.

The authors give the following process of assay of the green extracts of belladonna and hyoscyamus: From 2–5 grammes of the extract is weighed into a wide-mouth flask (as an Erlenmeyer), 25 c.c. of 90 per cent. alcohol is added, and the flask with its contents heated on a water-bath under an inverted condenser or other arrangement that prevents loss of alcohol and provides facilities for exhaustion. This operation is twice repeated with two more quantities of 25 c.c. of 90 per cent. alcohol. After each operation the alcoholic solution in the flask is allowed to become cold, and filtered, and the filtrates are united.

To make sure that extraction of the alkaloidal content is complete, the residue in the flask is warmed with a 5 per cent. solution of hydrochloric acid and filtered. The filtrate is then tested with solution of iodine in potassium iodide. Three extractions with alcohol are sufficient for the purpose.

To the alcoholic solution of the alkaloid an equal volume (75 c.c.) of a 5 per cent. solution of the hydrochloric acid of the Pharmacopœia is added, and the mixture shaken up three times successively with 15 c.c. chloroform. After separation and rejection of the chloroformic liquids, the acid solution is rendered distinctly alkaline by the addition of solution of ammonium hydroxide and again shaken up three times successively with 10 c.c. chloroform. The chloroformic solutions, after withdrawal, are mixed and evaporated, and the residue dried over a water-bath until it ceases to lose weight. The dry alkaloidal residue is titrated, as the Pharmacopœia directs in the final stage of the process for determining the proportion of alkaloid as given under Extractum Belladonnæ Liquidum.

The chloroformic separations take place quicker and cleaner than is the case in the Pharmacopœia process for liquid extract of belladonna.

It may be noted that the difference between the amount of alkaloid obtained by weighing and that indicated by subsequent titration is less than 0·01 gramme

The authors suggest that the strength of extract of belladonna should be fixed at 1 per cent., and that of extract of hyoscyamus at 0·2 per cent.

GLUTEN FLOUR.

VICTOR G. L. FELDEN.

A sample of so-called gluten flour, having been found to contain abundance of starch and but a small amount of gluten, the author subjected five commercial samples to detailed examination. With one exception, all but one proved to contain a large proportion of gluten, ranging from 60 to 76 per cent. The fifth sample—of American origin—contained 8·5 per cent. only. As regards starch and sugar, the four samples rich in gluten yielded from 7·6 to 16·7 per cent., whilst the one containing little gluten consisted of starch and sugar to the extent of 68·8 per cent., so that diabetic patients would gain little by using it instead of good wheaten flour. Since the proportion of gluten in flour is readily determined by simply washing a sample in a muslin bag and drying, the author suggests that all chemists who sell gluten flour should occasionally test their stock.

THE CHARACTERS AND METHODS OF ASSAY OF THE OFFICIAL HYPOPHOSPHITES.

BY H. A. D. JOWETT.

In the proposed methods of assay previously given, no author apparently made analyses of pure material and of mixtures containing a known quantity of impurity. Tyrer had previously taken into consideration that phosphite will behave in a similar manner to oxydizing agents as the hypophosphite. In the method suggested by Jowett the impurities are first removed by the addition of lead acetate, the excess of lead is then removed by hydrogen sulphide, and the hypophosphite contained in the filtrate completely oxidized to phosphate, which is then determined either gravimetrically or volumetrically. The author suggests a thorough revision of official tests for hypophosphites and the need of fixing standards of purity for the same—for the calcium and barium salts, 98 per cent.; for the sodium and potassium salts, 96 per cent.; for the ferric salt, 95 per cent.

SOME COMMERCIAL VARIETIES OF DILL FRUITS AND THEIR ESSENTIAL OILS.

By John C. Umney.

The dill fruits obtained from different countries by J. C. Umney do not show such marked difference in appearance as the fennel fruits from different parts of the world, but the differences are probably of greater medicinal importance. English, Indian, German and Japanese dill fruits are described, and analytical data given concerning their oils. The use of English or German fruits is recommended for the preparation of dill water, and preference for pharmaceutical purposes is given to the oils of the same varieties.

NOTES ON EXTRACT OF GINGER.

By T. H. W. Idris.

It is well known that alcoholic extract of ginger, commercially known as "gingerine," does not contain all the aromatic principles of the root, as most of the essential oil is carried over with the recovered alcohol.

In the course of experiments to produce extract of ginger that would contain the whole of the flavoring and odorous principle, it was found that acetone was the most suitable solvent, boiling as it does at 56° C. and being miscible with water in all proportions. The apparatus used consists of a modification of a Soxhlet on a manufacturing scale. If some powdered ginger be exhausted in a Soxhlet with acetone, and afterwards with alcohol, we find that the whole of the aromatic and pungent principles have been removed by the acetone, showing that it compares favorably with alcohol as a solvent. The acetone extract does not appear to have lost any of its volatile oil in the process of recovery, as is so markedly the case when using alcohol, while the last trace of acetone is easily removed by agitation with a little water. This acetone extract is a dark-brown substance of a treacly consistency, intensely pungent and at the same time possessing a full ginger aroma, the quality of which largely depends on the variety of ginger used.

It is readily soluble in alcohol, forming a deep-brown liquid. If steam be passed through the extract and then condensed, it carries over a quantity of the volatile oil with it. This oil floats on the surface of the condensed water, forming a yellow layer, and can be easily removed. The difference in aroma of the various kinds of ginger, though noticeable enough when examining the rhizome, is much more apparent when dealing with the oils themselves, and in this way a method of distinguishing the variety of ginger used is obtained. The various tinctures and essences of ginger may be very conveniently and readily prepared from this extract without the usual loss of alcohol, and syrup may be flavored with it by proper diffusion at a suitable temperature without the use of any spirit, and a further saving may be thus effected in manufacturing ginger-flavored beverages.

AMOUNT OF CARBONIC DIOXIDE AVAILABLE IN THE OFFICIAL GRANULAR EFFERVESCENT PREPARATIONS.

By C. S. Dyer.

The only practical method of determining the amount of gas was to measure the carbon dioxide volumetrically. The apparatus used was an ordinary Lunge

nitrometer with the urea determination arrangement attached. The nitrometer was filled with water, and to avoid absorption of CO_2, a little benzene was floated on the surface in the measuring tube, the resulting presence of the mixed benzene and aqueous vapor caused the amount of gas evolved to exceed the theoretical yield by about 10 per cent., so eventually mercury was employed.

The different samples were moistened with an equal quantity (2 c.c.) of water. This would, at same temperature and pressure, absorb the same amount of gas, which would not exceed 2 c.c.

Several specimens of commercial sodium bicarbonate were first tried, and were found to give almost identical results, all showing almost exactly the theoretical amount of CO_2.

Then to ascertain whether the loss of gas on granulating is due to the heating of the bicarbonate, *per se*, the same samples were exposed to a temperature of 100°–105° C. for ten minutes; that is, under the same conditions so far as heat is concerned as in the process of granulation. The resulting loss in weight amounted to about 2 per cent.; this is apparently water, the same quantity of gas being evolved.

The ingredients of the P. B. Sodii Citro-Tart. effervescens were then carefully weighed out and well mixed.

(1) Part of this mixture was immediately tested for quantity of CO_2.

(2) Part was dried below 54° C. without granulating (for comparison with No. 3), to see how much loss the necessary high temperature caused, and

(3) The rest was passed through the P. B. process, granulated and dried.

The two latter parts both lost about 10 per cent. in weight as the P. B. states, but that portion not heated much showed a higher percentage of gas available.

Citric acid loses nearly 9 per cent. of its weight in water of crystallization, and the amount present of citric acid is only 16 per cent. The other ingredients only lose about 2 per cent. in weight on treating. This loss is accounted for by the following:

Sodium bicarbonate, on combining with an acid, of course, produces CO_2 and H_2O, which is lost on drying. This amounts to 62 per cent. of the weight taken, and as the quantity present is about 46 per cent., the total possible loss in this way would be

$$\frac{46 \times 62}{100} = 28 \cdot 5 \text{ per cent.}$$

The observed decrease in weight is about one-third of this, roughly indicating that about 30 per cent. of sodium bicarbonate and acid has combined during the process. To see how far this is actually the case, the following figures will show.

Use mercury in the nitrometer; if using water, place a little benzine on surface, and remember the results will be 10 per cent. higher.

The Pharmacopœia ought, among the characters and tests of those preparations, to state the least amount of CO_2 which each should yield on the above treatment. Any sample which does not show, say, 50 per cent. of its bicarbonate available for producing effervescence, should not find its place in modern pharmacy.

Substance Experimented On.	Quantity Used.	No. of C.c. of CO_2 evolved at N. T. and P.
1. Sodium bicarbonate	·15 gramme ·15 gramme	41·6 C.c. 41·8
2. Ingredients of P.B. eff. citrotartrate immediately after mixing =	·3 gramme (46 p.c. $NaHCO_3$)	39·24 C.c., slight loss.
3. Ditto dried below 54° C., not granulated	·3 gramme	33 C.c. = 21 p. c. loss gas.
P.B. process carried through	·3 gramme	27 C.c. = 32 p. c. loss gas.
5. Good commercial sample by well-known maker	·3 gramme	26 8 " " "
6. P.B. Eff. Sodii Sulphas	·3 gramme	21·8.
7. P.B. Mag. Sulph. Eff	·3 gramme (contains only 36 p. c. soda)	15 C.c.
8. Sample of Mag. Cit., commercial	·3 gramme	15 C.c.

No. 2 shows a slight loss, the powder being very damp.

No. 3 shows nearly as much loss as in the final operations.

No. 4, 32 per cent. loss; this agrees with the loss in weight mentioned before.

No. 6, a comparatively old sample.

No. 7, this preparation contains only 36 per cent. of soda, against 50 per cent. of No. 6; the relative yield is therefore the same.

No. 8 contains about 33 per cent. sodium bicarbonate; result fair.

NOTE ON THE MYDRIATIC ALKALOIDS.

By H. A. D. Jowett.

The descriptions and tests of mydriatic alkaloids given in the new Pharmacopœia are considered by H. A. D. Jowett to be generally unsatisfactory, and, in some cases, misleading and inaccurate. In the case of atropine and its salts, he thinks the insertion of the color test with fuming nitric acid and potash is quite unnecessary, and he suggests that to ensure pure products, such as might reasonably be expected from manufacturers, reference should be made to the melting point, formation and melting point of the aurichloride, optical inactivity, and freedom from ash on ignition. It is suggested that the melting point of hyoscyamine should not be lower than 200°, that scopolamine or hyoscine hydrobromide should have its solubility given as 1 in 4 rather than 1 in 1, and that the melting point given for the dehydrated salt should also be modified.

A NEW CONSTITUENT OF LEMON OIL.

By J. C. Umney and B. S. Swinton.

In examining lemon oil the authors have separated an ester of geraniol, and they consider that the presence of this compound has an important bearing upon the odor and taste of lemon oil, and that a concentrated lemon oil must contain the ester in normal proportions, in addition to citral and citronellal, before it can be said to represent in a concentrated form the true odor and taste of the natural oil.

ALBUMINS AND SOME TYPES OF PROTEID DIGESTION.

By Gordon Sharp.

As the result of an examination of hard boiled egg-albumin and dried serum-albumin, the author arrives at the conclusion that peptone is absent from both.

Egg-albumin is said to yield unaltered albumin, alkali albumin, proto-albumose, a little hetero-albumose, and some crystalline matter of an alkaloidal nature; serum-albumin differs in yielding more hetero-albumose, together with a little deutero-albumose. Papain was found to digest serum-albumin much more readily than egg-albumin, yielding traces of proto and hetero-albumose, abundance of deutero-albumose, but no peptone. With pepsin, in both cases, the digestive process was carried further, traces of true peptone being found. In the presence of yeast, as in the maturing of koumyss, the albumin of the milk is partly changed into the higher proteids, but the peptone stage is never reached.

NOTE ON OIL OF EUCALYPTUS.

By E. J. Parry.

The author has made an examination of the oil obtained from the leaves of *Eucalyptus toxophleba* of Western Australia.

The oil has a most obnoxious and uninviting odor, and when inhaled induces violent coughing. Its specific gravity at $\frac{15{\cdot}5^\circ}{15{\cdot}5^\circ}$ is ·8288. It is faintly dextrorotary, about ·5° for 100 Mm. On fractionation it yielded the following results. It began to boil at 160°, rising rapidly to 168°. The fractions collected were :—

168°–171°	68 per cent.
171°–176°	14 " "
176°–182°	2 " "
182°–187°	8 " "
Residue	8 " "

With phosphoric acid the oil simply became syrupy. The first fraction was almost free from cineol, whereas the 8 per cent. distilling between 176°–182° was almost entirely cineol. A determination of this body in the fractions, which was necessarily only approximate, showed that the oil contains only about 15 per cent., certainly not more than 20 per cent., of cineol. Whilst phellandrene was present, as identified by its nitrite, it did not form anything like the remaining 80 per cent. of the oil; he was unable to search for any other bodies except aldehydes and ketones, the presence of which was indicated by an absorption by sodium bisulphite of about 10 per cent.; and for amyl alcohol, which has been identified in traces in some specimens of oil of *Eucalyptus globulus*. He was unable to find any trace of this body, however.

A QUICK POLARIMETRIC METHOD FOR THE DETERMINATION OF STROPHANTHIN IN THE B. P. EXTRACT AND TINCTURE.

By Edwin Dowzard.

The following method will be found useful as a means of approximately determining the amount of strophanthin in the P.B. tincture and extract :—

100 c.c. of tincture is evaporated down to about 20 c.c. on a water bath, 2 c.c. of a solution of basic acetate of lead then added, the mixture heated for a few minutes, and filtered, the precipitate being washed twice with warm water. The filtrate and washings are evaporated to about 10 c.c. and made up to exactly 20 c.c. with water, a portion of which is passed through a dry filter. The optical rotation of the filtrate is then taken in a 200 Mm. tube, using an instrument of the Laurent half-shadow type.

One minute is equivalent to ·03 gramme strophanthin per 100 c.c. of the liquid examined.

Example:—

100 c.c. of the 1885 tincture were treated as above; the rotation equalled + 0°30′. $\therefore \frac{0·03 \times 30}{5} = 0·18$ gramme strophanthin in 100 c.c. tincture.

It is necessary, of course, to divide the rotation by five, as the liquid is five times stronger than the original tincture.

In the case of the extract, the determination must be made before the reduction with milk sugar.

One gramme of extract is dissolved in 5 c.c. warm water. 2 c.c. solution of basic acetate of lead are then added, the mixture heated for a few minutes and filtered, the precipitate is washed with warm water until the filtrate and washings measure 20 c.c. The rotation is then observed, and the amount of strophanthin calculated therefrom as in the tincture.

ALGINOID IRON AND SOME OTHER ALGINOIDS.

By E. C. C. Stanford.

The property of passing through the stomach unchanged is possessed by few if any medicines, hence where this is desired, it is usually necessary to cover the medicament with such a body as keratin, on which the stomach has no action. A complete series of therapeutic compounds having this general property would be new to medicine, would probably give rise to new developments, and add considerably to the physicians' weapons for attacking disease. Such a series appear to be presented in the alginates. As far as has been ascertained, alginic acid and its insoluble medicinal salts, iron, zinc, mercury, bismuth, lead, silver, antimony, arsenic, etc., are unacted on by the gastric digestion, and pass the stomach unchanged. Hence the action of these metals may be expected to present some differences or variations of the ordinary effects when presented in this form, and for a distinctive and expressive name the author calls these "Alginoids."

The chemical formula of alginic acid is represented as $C_{76}H_{80}N_2O_{22}$ (*Jour. Soc. Chem. Ind.*, 1886, p. 218). It is a strong acid evolving carbonic acid from the alkaline carbonates in the cold; however, it is assimilated and it is known to be a nutritious food. The soluble alginates are those of the alkaline metals and of magnesium. The insoluble salts are of the other alkaline earths and of the heavy metals.

Alginoid Iron or Ferric Alginate.—Ferrous salts are not precipitated by sodium alginate, the ferric salt is obtained by decomposing ferric chloride with sodium alginate, both in solution. A gelatinous brown precipitate is obtained. When dry it forms a tasteless insoluble brown powder, having a composition leading to the formula $C_{76}N_{77}Fe_3N_2O_{22}$. It contains 10·97 per cent. of Fe.

It is soluble in ammonia, forming a deep reddish-brown solution, which, on evaporation, becomes insoluble in water, so that the alginoid iron can be administered in a liquid form.

The dry powder has, however, been mostly administered, and in all cases of anæmia and chlorosis, even where gastric ulceration was present, it has been well borne, and showed a sedative action by arresting vomiting and sickness.

It can be employed therefore, when other preparations of iron would not be tolerated. Being quite tasteless, it is readily taken by children. It has no astringent effect on the bowels, and does not produce constipation ; on the contrary, the effects are slightly laxative. It is given in doses from 2 to 15 grains. Some physicians have found the former dose quite effective.

Other alginoids, as of bismuth, mercury, arsenic, magnesia and of the alkaloids were referred to. The therapeutic trials of these are not complete.

A SHORT NOTE ON LIME WATER.

By E. T. Evans.

From the experiments of the author it would seem that lime water can be made in a few minutes, if a fairly pure caustic lime be recently slaked before using. Also that when intended to be kept, the lime water should be in contact with the excess of lime used.

THE CHEMISTRY OF THE 1898 BRITISH PHARMACOPŒIA.

By P. Kelly.

Changes in atomic and molecular weights, the introduction into the Pharmacopœia of structural and constitutional formulæ, alterations in nomenclature, modifications of tests, and the standardization of preparations of potent drugs, are referred to in this paper. The author states that, in his opinion, the 1898 British Pharmacopœia is an improvement on its predecessors, especially as regards its chemistry.

THE GALENICALS OF THE NEW PHARMACOPŒIA.

By H. Wippell Gadd.

The author considers that the New Pharmacopœia is in advance of the previous ones, the weakest point being the processes, and he adds, "one wonders if, in some future book, when pharmacy approximates more closely to an exact science, and the present tendency towards factory-made preparations has advanced still further, the galenicals may be treated as the chemicals are now, processes being omitted and tests extended."

A NOTE ON THE BOTANICAL NOMENCLATURE OF THE BRITISH PHARMACOPŒIA.

By G. C. Druce.

The author states that the changes in botanical nomenclature of the new Pharmacopœia are almost all made in the right direction, and points out some cases where the law of priority was not adhered to.

THYROGLANDIN.

By E. C. C. Standford.

The author claims that Thyroglandin represents the activity of the raw thyroid gland of the sheep, without its disadvantages and dangers, and that it contains the active principles in the form and proportion in which they exist in the raw gland.

KIESELGUHR AND OTHER INFUSORIAL EARTHS.

By John Moss.

The author gives a valuable essay on the origin, composition and uses of infusorial earths. He suggests the employment of diatomite as a diluent for hygroscopic powders, such as euonymin when made by the late Pharmacopœia process. It may also be employed for binding together drugs that compress with difficulty.

PHARMACISTS AND THE PHARMACOPŒIA.

By Peter MacEwan.

The British Pharmaceutical Conference should, in the author's opinion, take upon itself the task of revising the Pharmacopœia. He would have the Formulary Committee reorganized so that it should be representative (1) of the more important centres in the three kingdoms, preferably through local pharmaceutical associations; (2) of the Pharmaceutical Societies of Great Britain and Ireland; and (3) of every pharmaceutical association and society of interest in Canada, India, and the Colonies. This Grand Committee should appoint a smaller working committee, which should secure the co-operation of the Pharmaceutical Research Laboratory, and of any similar institution at home and abroad. Pharmacists would thus take the lead in the matter of Pharmacopœia revision, and might stipulate for more satisfactory conditions than now prevail when asked by the General Medical Council for assistance.

MATERIA MEDICA ANIMALIS.

By J. C. McWalter.

The author has given a concise and succinct account of the present state of our knowledge on the following animal extracts: succus testibus paratus; sperminum; cerebrum exsiccatum pulv.; cerebrum siccatum; glandulæ suprarenales siccatæ pulvis; hypophysis cerebri siccat. pulv.; medulla ossium rubra; ovaria siccata; renes siccata; thymus siccatus; prostata siccata pulv.; thyroidinum siccatum; hepar; lien preparatus; lien; mammæ; pulmones; glandulæ bronchiales; extractum corporis ciliaris; glandula parotis.

ON THE SALIENT FEATURES OF THE IRISH FLORA.

By G. C. Druce.

The species of flowering plants are relatively fewer in number in Ireland than in England, and, to a certain extent, Ireland is deficient in large, bright colored flowers, such as are found in the Compositæ, Labiatæ and Leguminosæ. There is also a great falling off of Germanic types in Ireland, and the Scandinavian types are only about one-third as many as in England.

A Delicate Reaction for Tannin is said to consist of a solution of 1 part of sodium tungstate with 2 parts of sodium acetate in 10 parts of water. A straw yellow precipitate is produced with this reagent in a tannin solution.

Pilocarpus Finnatifolius grown in the Botanical Gardens of Palermo, yielded according to Gaylio (*Apoll. Zeit.*, 1898, 130) as much as 0·62 per mille of pilocarpine nitrate. It is suggested that the cultivation of Pilocarpus in Sicily might prove to be a paying industry.

AMERICAN PHARMACEUTICAL ASSOCIATION.

The forty-sixth annual meeting of the American Pharmaceutical Association was held in Baltimore from August 29th to September 3d. This is the fourth time in the history of the Association that it has met in this charming city. The first meeting in Baltimore was held September 9, 1856; the second September 8, 1863; the third on September 13, 1870. At the fourth meeting the council met at 11 A.M., on Monday, August 22d. The names of sixty-two applicants were proposed for membership, and Dr. Frederick Hoffmann, of Germany, and Mr. William Martindale, of London, were elected honorary members. Reports of various committees were made, and it was announced that twenty-three of the members of the Association had died during the year, the oldest being A. B. Taylor, of Philadelphia, and the youngest Walter T. Sellers, who perished on the ill-fated United States Ship "Maine."

The first general meeting of the Association was held at 3 P.M. A large number of members, delegates and friends of the Association were present.

After President Whitney had called the meeting to order with introductory remarks, Mr. H. P. Hynson, Chairman of the Local Committee, told of the efforts of the committee to make the occasion one of great pleasure, spoke in flattering terms of the assistance rendered by each member of the committee, and introduced Mayor W. T. Malster. The latter was greeted with generous applause, and made a very clever address, it being considered one of the interesting events of the afternoon. He was accorded much attention, and received cordial applause for his generous welcome to the Monumental City, and his interest in and appreciation of the efforts of the Association, the members of which he was welcoming to Baltimore.

Following Mayor Malster, Dr. A. J. Corning made some appropriate remarks. The President then said he thought it would be interesting to hear from representatives of the various sections of the country. S. A. D. Sheppard, of Boston, spoke of the North; Dr. G. F. Paine, of Atlanta, Ga., for the South; and Mr. William Mittelbach, of Missouri, for the West. Professor Joseph P. Remington, of Philadelphia, who was also called upon for a speech, caused a wave of patriotism to pass over the hall when he said: "As I heard our President call on members to speak for the North, the South, the East and the West, this thought struck me: I wish he would call on some one to speak for America, for we're all one now. Since that splendid victory achieved by Dewey in the Bay of Manila, this country has known no section. We are all one—we are all for America."

Calling on the Second Vice-President of the Association, Mr. Wm. S. Thompson, to take the chair, the President then read his address, which was quite a lengthy one. He said in part:

I know of no way by which, in fewer words, I can convey to you my estimation and appreciation of the value of this Association, than by quoting in part the description of a painting that may be seen at the Providence Athenæum. It is a small painting on ivory by Malbone, of exquisite delicacy and beauty, called, "The Hours," representing the Past, Present and Future.

"The artist has depicted the 'Hours' as three lovely maidens: the Present standing in the brightness of the foreground, is beautiful in the consciousness of the pleasure of the hour, and the untried vigor of her youth. The Future is following close behind her sister, and the joyousness of anticipation is shown in every feature, with no shadow of disappointment to the brightness; but the Past, although no less lovely than her sisters, leaving all behind, is retreat-

ing regretfully and lazily into the shadow, but seems to linger for a moment, while the light of the Present falls upon her."

Thus, it seems to me, it is with this Association. The past, present and future of the A.Ph A. will give to the coming artist—a painter or writer—an ideal of unselfish work, scientific research, helpful, social and educational progress.

As one of the less than fifty living members prior to 1860, and, therefore, properly classed as of the past, I unhesitatingly declare that this Association has been, is, and will continue to be, one of the leading educational, guiding and helpful organizations, of special value to its members, and of unparalleled service to humanity.

It was my privilege, soon after my return from the Minnetonka meeting, to attend the one hundredth anniversary of the famous old frigate *Constitution*, launched from Boston in 1797 saved from the junk shop by Dr. Holmes' poem, "Old Ironsides," and now "resting upon the waters into which she rushed as she left the builder's ways a hundred years ago."

As I listened to the thrilling history and glorious achievements of this noble old ship, the courage, skill and wisdom of her brave commanders, Hull, Bainbridge and Stewart, my thoughts wandered to the craft of the A.Ph.A., and I saw in misty form the faces of Maisch, Procter. Parrish, Taylor, Squibb, and others of our early crew; and recalled the services and loyal contests our ship and crew have had in creating colleges of pharmacy, battling successfully against ignorance and duplicity, establishing boards of pharmacy to enforce and increase educational work and check any possible piratical craft, like the quiz book and cut-rate personal cramming. We have many instances in Massachusetts of these ways that are dark, even to the taking of an examination by an expert for the would-be pharmacist, for which offence each man paid the penalty of six months' service in the House of Correction.

The A.Ph.A. has no better "feeder" to draw from, than the State Associations, and it is a personal satisfaction to note the loyalty of our members to this branch of our work. If any have failed to appreciate the service rendered and the possibilities, I would suggest the careful reading of the several State Proceedings. Time forbids the allusion to more than one, and that one, the Pennsylvania Pharmaceutical Association. I refer particularly to their Proceedings of 1895, sent me by one of its members. I make brief quotations. Professor Remington, discussing associations and organizations, said: "There is a need in this country for an organization of a totally different kind. There is a need for the retail druggists to get together and form an organization, in which they will not admit the wholesaler, the professor in the college of pharmacy, or any school, or connected with an educational institution, or the proprietor of a remedy; but a retail druggists' association, pure and simple, which shall be controlled by the retail druggists of this country. There is a need for it"

The writer of a paper uses these words: "The manufacturers are the managers of the incubator where the cutter is hatched."

I cannot resist the temptation to quote briefly from a paper read by our Mr. Patton, of York. He says: "Thus the queer anomaly presented by reversing the order of therapeutics by fitting the disease to the remedy, instead of the medicine to the disease. The enterprise of the manufacturer does not stop here. We observe a tendency to eliminate the physician also, for we do not find treatment and dosage, with other information conducive to self medication plainly printed on their packages. A resolution unanimously adopted by the Pennsylvania Medical Society at their last meeting called upon the manufacturers to cease this reprehensible practice. It will cease, or otherwise, according to the commercial aspect of the question from the manufacturer's point of view. Having by the aid of the physician introduced their products to the consumer, they would now instruct the latter to do without the services of the former, a case of base ingratitude. If the foregoing statement is open to question, there is no question about the present tendency on the part of the pharmacist to take care of himself. He has awakened to the fact that between the upper and nether mill stone of the cutter and manufacturer, he was being pulverized very fine. As the operation is not a pleasing one, especially to the victim, it behooved him to be up and doing, and endeavor to meet them on their own ground. Lessening business, and diminishing profits cannot go on forever. The limit will be reached in extinction."

An enthusiastic worker in our Association, quoting from a medical journal, says:

"It needs no prophetic eye to see the extinction awaiting the practicing physician, using the term in contradistinction to the hospital or dispensing physician. Surgeons, aside from professors and hospital and dispensary surgeons, are already extinct. The drag net of the ambulance, dispensary, clinic and hospital have secured such a 'corner' in surgery, that no man outside of the chosen few can make a living. What has occurred in surgery is now occurring in medicine. No patient, able to walk or ride to a hospital, need pay a cent for

medicine or treatment, and the weary and struggling outside general practitioner can go home, shut himself up with his emaciated wife and starving children, and turn on the unlighted gas." The Journal of the American Association, referring to the same subject, says: "The doctor as a private physician, working for himself, will more and more find his position disappearing. There will be general practitioners in out-of-the-way places, as there are now; there will be men of rare ability, who will attract by their personality and who will remain individualistic in their work. But the great mass of town physicians may be obliged to adapt themselves to other conditions, and either become salaried employees of State and private institutions, or form mutual and co-operative hospitals and dispensaries, thereby employing themselves; which plan or plans will soonest find adoption, the future alone will tell; but the general physician will probably not remain as he is, and sooner or later will be obliged to choose between the old and the new paths." The writer then adds: "If the prophets are true, and the physician of the future is to exist as part of the great medical institution, the pharmacist will follow suit. . . ."

While I do not agree with the medical journals or physicians quoted, that the future of the average physician is a close room with the unlighted gas turned on, I think we must all agree that those physicians who are too indolent or too ignorant to write for such remedies as each case demands, and who depend upon the printed slips of specialties, tablets or triturates, are certainly approaching a suicidal condition. It is not for us to discuss the future of the physician, but when the writer adds, "the pharmacist will follow suit," we protest. Pharmacy is a science, and we don't propose to abandon our scientific methods by any such unscientific, selfish and cowardly act. We have been trained, and our life depends upon faithful service for the public good; and exposing the public to the hazard of gas explosions is not for the public good.

Feebly, and as briefly as possible, I have presented a few points which seem to me to demand your careful consideration

Fellow-members of the American Pharmaceutical Association: As sure as the sun rises in the east and gives us light, as sure as the North Star has been a guide to the mariner, so sure is it that the American Pharmaceutical Association has been and will continue to be the light and guiding star of the coming pharmacist. Because clouds sometimes obscure the light, or storms and contentions drive us from our course, are we, like the clam, to bury ourselves in the sand? There is a future for pharmacy; there is work for us to do at at the present and in the future as in the past. Our colleges of pharmacy are graduating one thousand or more every year. Lectures by mail, correspondence, and private instructions with special study are enabling boards of pharmacy, so far as I can judge, to register two thousand or more every year. And it is but fair to assume that the average pharmacist of the past three years is a better educated and professional pharmacist than the average pharmacist of ten years ago, hence the educational progress must be an accepted fact. I repeat, there is a future for pharmacy; and the future may be likened to the mining industry. Mines that have been profitably worked and exhausted, as supposed, have, under modern skill and science, been reopened and worked more profitably than before So pharmacy to-day, in a few places, is testing and experimenting on the lines of assay, analysis, microscopy and bacteriology.

The President's address was received and referred to a Committee consisting of W. S. Thompson, of Washington; S. A. D. Sheppard, of Boston, and H. M. Whelpley, of St. Louis. President Whitney then resumed the chair and Secretary Caspari called for the various standing and special committees. The selection of the Nominating Committee to elect officers for the ensuing year was the next business in order, and a recess of five minutes was granted for the purpose of affording the members for the various States, Territories and Provinces an opportunity to choose their representatives. The following States, etc., were represented: New York, Alabama, Georgia, Maryland, Vermont, Maine, Missouri, Massachusetts, Ohio, Illinois, South Carolina, Iowa, Michigan, Kentucky, Connecticut, New Jersey, Indiana, Pennsylvania, Canada, Virginia, Rhode Island and District of Columbia. These selected their representatives and nominators. In addition the President appointed at large five members. The Nominating Committee decided to meet after the adjournment of the session.

The President then appointed a Committee on Time and Place of next meeting, of which Professor Remington was chairman. The session then adjourned until the following morning. In the evening a reception was given which was opened by a musical programme, rendered by Steinwald's orchestra, which played from the stage of the hall. Chairs and tables were placed conveniently through the hall, and refreshments were served during the rendition of the musical programme. This was followed by informal dancing. The reception was a successful feature of the social portion of the programme.

SECOND GENERAL SESSION.

The second general session was held at 10 A.M. on Tuesday morning, the President in the chair. Secretary Caspari read the minutes of the first general session, which were adopted as read. The minutes of the Council were then read by the Secretary of the Council, Mr. Kennedy. The Nominating Committee reported the following ticket as the choice of the Committee for officers of the Association for the ensuing year:

President—Charles E. Dohme, Baltimore, Md.

First Vice-President—George F. Payne, Atlanta, Ga.

Second Vice-President—James H. Beal, Scio, O.

Third Vice-President—Miss Josie Wanous, Minneapolis, Minn.

Treasurer—S. A. D. Sheppard, Boston, Mass.

General Secretary—Charles Caspari, Jr., Baltimore, Md.

Reporter on Progress of Pharmacy—C. Lewis Diehl, Louisville, Ky.

Members of Council: (*a*) For three years, H. M. Whitney, Charles A. Rapelye and Wm. S. Thompson. (*b*) To fill vacancies caused by two resignations, Thomas F. Main and John Ingalls.

The report was received and the officers elected, the Secretary being instructed to cast an affirmative ballot. Secretary Caspari then announced that he had received the credentials of delegates from a number of State and local Associations, Colleges of Pharmacy, and their Alumni Associations and other bodies. On motion these were received by the Association, and the usual privileges accorded the delegates.

The various Special Committees gave their reports, being as follows: Committee on Transportation, C. A. Mayo; Special Auxiliary Committee on Membership, H. M. Whelpley; Committee on National Formulary, C. Lewis Diehl; Committee on National Department of Health, Jos. P. Remington; Committee on General Prizes, Frank S. Hereth, recommended that the first prize be awarded to Knox and Prescott for the Caffein compound in Kola; the second prize to Dohme and Engelhardt for paper on Chemistry of Cascara Sagrada; the third prize to Henry Kraemer for paper on Examination of Powdered Vegetable Drugs; Committee on Ebert Prize, Albert B. Prescott, reported that this prize be awarded Virgil Coblentz for his paper on Gelsemic Acid; Report of Chairman of Council, having charge of the funds of the Association, Wm. S. Thompson; Committee on Pure Food and Drug Congress, reported by J. H. Redsecker; Committee on Meeting of 1900, Wm. C. Alpers. F. G. Ryan, Chairman of the Special Committee on Weights and Measures, reported the advances made in the use of the metric system in the various parts of the world, and offered a resolution requesting medical colleges in America to teach their students the metric system exclu-

sively, beginning with the college year 1900. This, in the Chairman's mind, being the only practical way of bringing the metric system into general use in medicine and pharmacy.

The Committee on Membership, through Mr. George W. Kennedy, its Secretary, reported that the Association has now 1,306 active or contributing members, 98 life members and 11 honorary members, making a total membership of 1,415.

The report of S. A. D. Sheppard, the Treasurer, showed that the receipts during the year amounted to $9,535.65, and the disbursements aggregated $6,337.64, leaving a balance of $3,198.01 on hand.

The Committee on Time and Place of Next Meeting proposed that the next meeting take place in Put-in-Bay, Ohio, on September 4, 1899.

The report of the Special Committee on National Legislation, of which F. E. Stewart is chairman, had particularly to do with the subject of patents, trade-marks, etc. It stated that during the past year the American Pharmaceutical Association has been especially honored by the National Association of Manufacturers. The chairman of the Committee on Patents of said Association invited the chairman of your Committee on National Legislation to take part in the deliberation of said Committee on Patents. One of the most active and prominent members of that committee is also secretary of the National Association of Inventors and Manufacturers, and both associations are acting in strong accord along similar lines. Three important and influential associations have thus been brought into touch with a common purpose in view, viz., the proper interpretation and partial revision of the United States patent and trade-mark laws. Your committee now reports that by the combined efforts of the three associations referred to, aided also by other influence, the desired object is in the way of being accomplished, for the President of the United States has recently appointed a commission to revise the United States patent and trade-mark laws. This commission consists of Francis Forbes, of New York; Arthur P. Greeley, of New Hampshire (Assistant Commissioner of Patents), and Peter Grosscup, of Illinois.

The importance of clearly defining the problem now before the Association by the appointment of the commission above referred to is very evident. It is time to drop vague terms and loose definitions and call things by their right names. The terms "patent medicine," "proprietary medicine," "secret nostrum," "trade-mark pharmaceutical," etc., will no longer suffice. We must define clearly our premises before we can satisfactorily enter into arguments with our opponents.

The common understanding of the term "patent" medicine is "secret" medicine. The term is a misnomer when thus applied, for a thing patented is a thing divulged.

The common understanding of the term "proprietary" medicine is a medicine whose commonly accepted name is registered as a trade-mark. But, registering such name as a trade-mark does not make it a trade-mark, for a title which the public use to describe the article cannot at the same time perform the function of a brand-mark, to distinguish one make of the article from another make of the same article.

A "secret" medicine is thus defined by the official Medical Board of Saxony: "Secret remedies are all those agents sold for the prevention and cure of diseases of men and animals of which the ingredients, percentage, composition and method of preparation are not made public when first announced for sale. Such information must be complete and exact, in readily comprehensible language, and made known to all desirous of such information."

Taking the above facts into consideration, it is evident that a patented medicine is neither a "patent" medicine nor a "proprietary" medicine, nor a "secret" medicine. The object of the patent law is to promote progress in science and the useful arts. Can it be applied to medical science and the associated arts of pharmacy, pharmaceutical chemistry, and therapy, in a manner to realize this object? Owing to the impossibility of ascertaining the true value of a new introduction to the Materia Medica as a therapeutic agent, except by years of patient investigation by competent observers, working under different circumstances, with opportunities for freely criticising each other's work, untrammeled by commercial consideration, the granting of patents for inventions in the therapeutic art does not seem practical.

The trade-mark law should so read as to make it necessary for every article of commerce, when first introduced, to have a name given it for public use as a part of the common language. It should also require that the common descriptive name of each article advertised

should appear in advertisements equally prominent with its brand-name, so that the latter may be used by the public for the purpose of specifying a particular brand when desired, and the former employed to designate the article itself as such, irrespective of who is the maker. In describing trees as to natural order, genera and species, so is it in describing medicines: every kind of tincture, fluid extract and pill must have a specific name by which it may be described, and if the introducer does not supply it he has no reasonable cause of complaint if the name claimed by him as a trade-mark ceases to perform its function as a brand-mark and falls into the public domain as a descriptive word or appellative. The trade-mark law should be so revised that its ambiguous wording will not protect those who desire to create perpetual monopolies of secret medicines by claiming that their commonly accepted names are trade-marks.

Your committee has been informed that the preamble and resolutions on the subject of patents and trade-marks, which was presented by the American Pharmaceutical Association to the American Medical Association, and which was referred back to the American Pharmaceutical Association for final action and returned after debate at the last annual meeting of the latter Association, was referred by the American Medical Association to its Section on Materia Medica, Pharmacy and Therapeutics. Said Section appointed a committee consisting of Prof. Warren B. Hill, of Milwaukee, and Dr. Robt. G. Eccles, of New York, for further consideration of the document referred to. Your committee is now informed that these gentlemen will doubtless suggest the formation of a committee on the nomenclature of Materia Medica titles, and your committee, therefore, suggests that the American Pharmaceutical Association should also appoint a committee on nomenclature to co-operate in this important work.

SCIENTIFIC SECTION.

The report of the Special Committee on the Status of the Pharmacists in the Army, Navy and Marine Hospital Service of the United States was given in abstract by the chairman, Geo. F. Payne.

The Scientific Section met for its first session on Thursday morning, at 10 A.M. The first thing being the Chairman's address. This was a scholarly effort on the part of Dr. Ed. Kremers, and devoted to the consideration of the constituents of the many volatile oils. After the reading it was referred to a committee consisting of Messrs. Rusby, Sayre and Stevens. Reports of the various Committees were submitted. The Committee of the Association of the U.S.P., through its Chairman, Mr. Eliel, submitted the following: that Linimentum Saponis be made from the dried soap and not the powder; the per cent. of chlorine in chlorinated lime is too high, and should not be more than 30 per cent.; that no crude carbolic acid of the strength required, is upon the market; a large number of vegetable drugs of the Pharmacopœia are described as being inodorous, when they really do possess odor; an additional identity test should be added to potassium sulphate; the Research Committee examine into the relative value of the various constituents of digitalis; the aloin standard should be made for aloes; to change the name of Resina Podophylli to Podophyllin; Tr. Ferri Chlor. should be kept at least twelve months after making before being used; the establishment of a class of 50 per cent. tinctures and a Research Laboratory. This Report was referred to a Committee consisting of Messrs. Remington, Coblentz and Kraemer. Considerable discussion followed by the various members.

The Reporter on Progress of Pharmacy read the preliminary part of his Report. The first paper read was on

STANDARDS FOR BLACK AND WHITE MUSTARD.

By J. U. Lloyd.

This is reprinted in this Journal, on p. 433. Accompanying this paper was a letter containing the recommendations of C. T. P. Fennel to Prof. Prescott,

under whose auspices the investigation had been undertaken. Then followed the other papers.

AROMATIC WATERS.

BY H. V. ARNY.

See this JOURNAL, p. 442.

TIME LIMITS OF THE UNITED STATES PHARMACOPŒIA.

BY JOSEPH FEIL.

The author called attention to the desirability of the U.S.P. prescribing a time limit that certain preparations may be kept. Tr. Iodi will retain its strength twice as long when kept in the dark as when exposed to the light; diluted hydrocyanic acid deteriorates to one-half strength in six months, and may be readily prepared by the second process given in the U.S.P. Among galenicals that could be profitably marked with time limits, in addition to other precautions are: Syr. of wild cherry, syr. of altheæ, sol. of lead subacetate, camphor water, fennel water, anise water, dilute nitrohydrochloric acid, solution of hydrogen dioxide and certain cerates and ointments.

In the afternoon session the following papers were read:

THE GENERIC NAMES OF PLANTS.

BY H. H. RUSBY.

The author indicated the relations of the Pharmacopœia to standard authorities, and urged the necessity of perfecting its formulæ and definitions, to keep it in harmony with such authorities. As changes in botanical names refer only to the definitions, and do not affect the titles by which the drugs are known, neither safety nor convenience is disturbed by such changes. We do, however, secure accuracy for our guidance in cases of doubt, calling for an appeal to the definition. If deemed wise to adopt the German (Engler and Prautl) in place of the English (Bentham and Hooker) authority, we should find only eight changes involved.

The two works were then compared as to dates of publication, authorship, bases of classification, the ground covered, the mode of treatment, the nomenclature employed and the judgment displayed. It was concluded that the German work represented a great advance in botanical classification, and its adoption as the U.S.P. standard was recommended.

The paper was accompanied by elaborate tables displaying the comparative order of arrangement, and the composition of all the families treated in the two works.

SCIENTIFIC SYNONOMY OF OUR INDIGENOUS PLANTS.

BY A. B. LYONS.

In this paper the author reviews briefly the history of nomenclature, and has collated the synonyms of our indigenous plants.

QUALITATIVE EXAMINATION OF POWDERED DRUGS.

BY HENRY KRAEMER.

This is an additional contribution in the study of powdered drugs from this author, and deals with the determination of any one of something like 300 unknown powders. The paper will be printed later in this JOURNAL.

CATHARTIC ACID IN RHUBARB.

By A. B. Stevens.

The author has separated a large quantity of this acid by a modification of the former method employed by him and George P. Wilder. The evaporation was performed without direct heat by passing a current of air, warmed and dried, over the liquid, which was constantly agitated with a mechanical stirrer. It is proposed, in a subsequent investigation, to compare the acid of rhubarb and that obtained from senna.

THE BITTER PRINCIPLE OF CASCARA SAGRADA.

By A. R. L. Dohme.

The fluid extract of the drug was evaporated until all of the alcohol was removed, resulting in the precipitation of a resin. The clear filtrate was treated with calcined magnesia, and produced a dark brown precipitate. This was treated when dry with alcohol, whereupon it became reddish and dissolved with the exception of a wax-like residue. The alcoholic solution was evaporated and the residue treated with dilute sulphuric acid, whereupon the greater part remained undissolved, and the acid liquid resulting yielded to ether a light brown colored resin. It is believed that the residue left when the magnesium salt is treated with sulphuric acid is the bitter principle, as it has an extremely bitter taste of marked and increasing intensity. This is an acid resin and has been saponified. He has also obtained two other substances, neither of which have, however, as yet been obtained in a pure form. The work will be continued, and the nature of the four substances described ascertained.

ALKALOIDAL CONSTITUENT OF TARAXACUM.

By L. E. Sayre.

The author has continued his investigations and finds a small amount (0·002 per cent.) of an alkaloid in taraxacum root. This principle gave copious precipitate with Mayer's reagent, gold chloride and other alkaloidal reagents.

NOTE ON "GOGO," A PHILIPPINE ISLAND DRUG.

By E. H. Gane.

"Gogo" is the native name given to the fibrous portion of the trunk of *Entada scandens* Benth, N. O. Leguminoseæ. The product is of stem and not root origin. It occurs in long, flattened pieces, ¾ feet in length and ¾ inch wide, of a brick-red color and of very fibrous nature, interspersed with long, tough woody strings. The woody strings consisted of wood vessels of enormous size and length and are very characteristic. The seeds have been found admixed with calabar beans and are reputed to possess emetic properties. The drug possesses an acrid burning taste when chewed, and when swallowed causes considerable nausea. The drug contains 0·56 per cent. saponin, which appears identical with that of quillaja. The curative power of the drug is evidently due to the saponin.

DIFFERENTIATION OF COAL TAR PRODUCTS.

By H. P. Hynson.

The author takes a 2 per cent. alcoholic (95 per cent.) solution of the drug and burns off the alcohol by applying a lighted match directly to it. The nature

of residue remaining is different for the different coal tar products and characteristic for each synthetic product.

INCREASE OF DENSITY IN DISTILLATES OF WINES AND OTHER SPIRITUOUS LIQUORS.

By A. B. Lyons.

The condensation which takes place when alcohol and water are mixed does not seem to be completed immediately. This gradual progressive condensation of mixtures of alcohol and water seems to have been known or suspected by Townes when he constructed his alcohol table, for he allowed his mixtures of alcohol and water to stand two days before taking their specific gravity, but nothing is said about it in the instructions given for determining alcohol in liquors by distillation. The author finds this same slow condensation to go on in mixtures of commercial alcohol with recently boiled distilled water.

PRECIPITATED CALCIUM PHOSPHATE.

By Joseph Feil.

The medicated waters of 1890 are poorer than those of 1880 Pharmacopœia, on account of the solubility of calcium phosphate in water, tending to promote the growth Confervoideæ. In the case of Tr. Opii, this is much more serious. It is well known that the laudanum in drug stores is deficient in strength. Many causes have been assigned for this. Professor Good thought that this was due to the formation of morphine phosphate in the course of preparation. Experiments show this to be true to an unappreciable extent, about $\frac{1}{150}$ of the amount of morphine in the opium remains in the magma in the percolator. The real cause is a physical one. Calcium phosphate instead of aiding the exhaustion, prevents the thorough percolation of the opium. The old process of maceration is recommended in preference to the percolation method.

THE FOOD VALUE OF LIQUID FOODS.

By E. H. Bartley.

This paper describes the methods of determining the value of foods and takes up the prepared foods, prepared from meats, showing that such preparations have either a stimulant action, depending upon the presence of the extractive matters, or a true food value depending upon the contents of albumin or other proteid. The food value of gelatin, carbohydrates, alcohol, etc., and the cost of such foods, to the public, necessary to furnish a definite unit of heat value.

BEZOARS AND BEZOARDICS.

By E. H. Gane.

This paper is historical, and reviews the origin and use of the bezoars, oriental and occidental, as well as the official, in the old London and Edinburgh Pharmacopœias. The high price and scarcity of the genuine bezoars led to the preparation of a series of remedies in imitation of, or supposed to resemble in properties, the official article. There were the mineral, animal and various other bezoardics. These were all prepared by a similar process, by heating butter of antimony and nitric acid, with oxides of the various metals. A large number of quotations from old dispensatories, etc., are given, showing the preparation and uses of these specifics.

The following papers were read by title :

STANDARDIZATION OF VOLUMETRIC ACID AND ALKALI.

By W. A. Puckner.

ASSAY OF SPIRIT OF NITROUS ETHER AND AMYL NITRITE.

By R. Fischer and J. A. Anderson.

DECOMPOSITION OF IODOFORM BY LIGHT.

By E. C. W. Kooke.

DEODORIZED TINCTURE OF OPIUM.

By E. L. Patch.

SPECIFIC GRAVITY OF SOLUTIONS OF CITRIC ACID.

By A. B. Lyons.

STERILIZATION OF INFANT'S FOODS.

By O. W. Krueger.

GLASS FLOWER MODELS.

By H. Benden.

ARACHIS OIL.

By J. W. Thomas.

BÉBÉES AND NOTES ON ESTIMATING EUCALYPTOL.

By Lyman F. Kebler.

Before adjourning at the morning session, J. U. Lloyd made a few remarks relative to the loss of the Association, and particularly of the Scientific Section, in the death of Prof. Henry Trimble. The speaker and others followed, paying their tributes to his memory. It was moved that the Secretary of the Section at this time convey the sympathies and condolence of the Scientific Section of the American Pharmaceutical Association to the widow and children of Prof. Trimble in this their hour of bereavement.

Upon adjourning at the afternoon session, the newly-elected officers were installed. Henry H. Rusby, Chairman, and H. V. Arny, Secretary. Prof. Prescott was reappointed Chairman of the Research Committee.

In the evening, Prof. Wm. Simon delivered a lecture on "Liquid Air," which was illustrated with experiments and diagram illustrating its manufacture. The changes induced in some common substances when put into the liquid air, were striking, as paraffin, ice, rubber band, piece of beef becoming brittle ; albumin of egg crystallizing ; a mercury hammer was employed to drive tacks in a board ; alcohol changed to a mass of white crystals ; change in color of red mercuric iodide and potassium bichromate crystals ; copper, however, remains malleable, and copper sulphate does not change in color. The lecturer employed various other interesting experiments, illustrating the properties of liquid air, and closed with some remarks on the future of this substance.

SECTION ON EDUCATION AND LEGISLATION.

On Friday morning the Section on Education and Legislation held its first meeting. The first thing in order was the reading of the Chairman's (J. O.

Beal's) address, which was devoted to the consideration of the status of pharmacy laws and prospective reforms in pharmacy by means of proposed legislative action. Stress was laid upon the necessity of a college education as a prerequisite for registration, and the fact that there are more important factors for improving the present evils in pharmacy than in the passage of laws. He further did not believe in making two classes of pharmacists, but that the registered pharmacist and qualified assistant alone should be recognized and that some time should elapse before the latter can become a registered pharmacist. The address was accepted and referred to a committee for action. In the discussion which followed, it was apparent that the mercantile side of pharmacy was drifting into the hands of department stores, and that the best part of pharmacy—requiring the educated pharmacist—remains with him.

The Secretary's (H. B. Webster's) report showed the progress of legislation in the different States. The following papers were presented in this and the remaining two sessions of the Section :

THE METRIC SYSTEM IN MEDICAL COLLEGES.

By H. M. Whelpley.

The author sent letters containing certain queries for answers to 154 medical colleges, asking among other things the extent to which the metric system was taught in the medical colleges. The answers of fifty-one out of sixty-seven indicated that they were employing the metric system wherever practicable. In the discussion which followed, F. G. Ryan called attention to some statistics which he had received from the Erie Pharmaceutical Association on the employment of the metric system by physicians.

COLLEGES OF PHARMACY AND THE NEW PHARMACOLOGY.

By R. G. Eccles.

The author, in a previous paper read at this meeting, on "The New Pharmacology," defined pharmacology as the science, not art of pharmacy. The laws underlying pharmaceutical operations he said are an extension of the laws of chemistry.

NOMENCLATURE OF THE MODERN SYNTHETICS.

By Virgil Coblentz.

The object of this paper was to find a method of naming the various synthetic compounds of modern medicine from their chemical composition. The paper dealt with the known and suggested origin of the various organo-bismuth combinations and derivatives of phenetidin, pyrazolon, quinolin and phenol. Coblentz claims that it is not practicable at the present time to give a system for naming the modern synthetics and that the present method is as good as we have.

PHARMACOLOGY AND PHARMACY.

By A. R. L. Dohme.

Pharmacology was defined from the medical point of view, and the author claimed that as it pertains to drugs it is properly a part of the study of them. It broadens and completes the knowledge of drugs and brings the pharmacist

and physician in closer touch with each other, and the author claimed it to be a valuable factor in the teaching and practice of pharmacy.

SHORTER HOURS FOR PHARMACISTS.

By W. C. Alpers.

The author recommended that the agitation for shorter hours among pharmacists continue, and that the restriction to sixty-six hours of employment during the week for drug clerks be allowed, the proprietor to divide the time as he may see fit.

STATE BOARD EXAMINATIONS.

By Harry B. Mason.

In this paper the author discusses as to whether a man is a competent pharmacist who passes the State Board examination, after failing three times, and comes to the conclusion, with Dr. Kremers, that no applicant should be allowed more than, say, three examinations.

SIMPLIFIED ORTHOGRAPHY.

By Seward W. Williams.

In the matter of orthography and nomenclature the author is of the opinion, that unless conditions of safety against mistakes forbid, it is certainly better that the Pharmacopœia should be active rather than passive in the matter of orthography and nomenclature. He states, however, that it is more of a matter of convenience than that of safety that presents greater difficulties in the matter of orthography and nomenclature.

PHYSICS, THE FOUNDATION OF PHARMACEUTICAL PEDAGOGICS.

By Joseph Feil.

The author gives an outline of physical experiments which can be readily undertaken in any laboratory and which tend to develop those perceptive powers required to understand the processes of every-day pharmacy.

THE SCHOOL OF PRACTICAL EXPERIENCE.

By E. L. Patch.

Unless experience be guided by correct theory, she is as apt to teach lessons that were better never learned as to teach those of practical value. The author indicates that correct theory should precede correct practice and indicates some experiences which are, and some which are not, practical.

POISON: ITS LEGAL DEFINITION AND SALE.

By F. H. Freericks.

Since it has been impracticable to place upon the word "poison" a construction sufficiently broad to be used without hardship and sufficiently limited to be safe, the author expresses the opinion that the Revision Committee of the U.S.P. is the proper authority for framing a proper definition, and that it is also desirable that the Pharmacopœia state what drugs shall be considered as

of dangerous character based upon the maximum doses in which they may be administered. The author appends a rough classification of a list such as the Pharmacopœia might adopt.

PHARMACEUTICAL TEACHING.

BY T. D. REED.

The author has formulated certain principles to be employed in pharmaceutical teaching.

THE LEADERSHIP OF THE PHARMACOPŒIA.

BY W. L. SCOVILLE.

The paper deals with the practical side of the Pharmacopœia, and in it he finds something more than a scientific and standard work, but one which meets many business demands.

ORGANIC CHEMISTRY FOR PHARMACISTS.

BY F. J. WULLING.

The author outlines a course of laboratory work in organic chemistry for pharmacists.

THE UNITED STATES PHARMACOPŒIA AND THE MEDICAL PROFESSION.

BY F. E. STEWART.

To make the Pharmacopœia more largely acceptable to the medical profession, it should follow the profession and not attempt to lead it. The author is also of the opinion that an obstacle which has stood in the way of making the United States Pharmacopœia more largely acceptable to the medical profession has been the misunderstanding with regard to our patent and trade-mark laws as related to medical science and its associated arts.

FINAL EXAMINATIONS.

BY L. E. SAYRE.

The author contends that final examinations have advantages similar to those of the ordinary recitation, quiz and periodical review.

CARE AND CONTROL OF PRESCRIPTIONS.

BY J. M. GOOD.

The Missouri pharmacy law makes the pharmacist the proper custodian of the prescription, and, as a logical deduction, decides the ownership.

The following papers were also presented :

ACCESSORY PHARMACEUTICAL EDUCATION.

BY E. H. FARTLEY.

SECRETIONARY ANALYSIS AND BACTERIOLOGICAL EXAMINATIONS BY PHARMACISTS.

BY A. R. L. DOHME.

PRACTICAL PHARMACEUTICAL LEGISLATION.

By H. S. Webster.

PHARMACEUTICAL EDUCATION, EXAMINATION AND THE PRESENT AND FUTURE STATUS OF PHARMACY.

By Alfred B. Husted.

The report of the Committee on a Model Pharmacy Law was read by Professor Remington for the Chairman. In it is contained a review of the history of pharmacy laws, with a summary of the results of each year's work. The report consists chiefly of the results of letters sent to various associations, etc., no less than three hundred sources of information having been utilized. The report closes with certain recommendations relative to what ought be considered in a model pharmacy law.

At the third session of the Section on Education and Legislation, the officers of the Section were elected and installed, viz.: Chairman, H. B. Lyons; Secretary, C. B. Lowe.

COMMERCIAL SECTION.

The Commercial Section met on Tuesday evening at 8 o'clock. The Chairman (Joseph Jacobs) opened the meeting with an address and had prepared several interesting papers. In the one on

CHANGES IN THE DRUG BUSINESS,

Mr. Jacobs indicated the changes to be in the method of conducting the drug business are principally the decline of the prescription department, the introduction of the tablet triturate, the manufacture of physicians' private recipes by the large manufacturing establishments, the preference of many physicians for the ready-made compounds, and the absorption by the department stores of the line of goods generally known as toilet, fancy and sundries.

Mr. Feil read a paper which indicated that drug stores in the United States are in numbers on the decrease. He stated that in 1897 there were 1,201 less drug stores than in the preceding year, or a loss of 3·2 per cent.; that in 1898 there are 996 less than last year, a loss of 2·7 per cent., and that in 1898 there are 2,197 less stores than two years ago, a loss of 5·9 per cent. Wholesale druggists numbered, in 1896, 296; in 1897, 290, and in 1898, 284. Thus, it will be observed, there is also a falling-off in the number of wholesale druggists.

L. E. Sayre read a paper on "The Drug Business Before the Advent of the Price Cutter."

Resolutions were reported by C. A. Mayo, in which protest was made against the unjust discrimination against the drug trade by confining the war revenue tax to medicines and perfumery and the recommendation made that the Section memorialize Congress, requesting that the war revenue tax be applied also to all articles of a proprietary nature put up in packages for popular use, whether the article be in the nature of a food, a beverage, a cosmetic, a medicine or for use in the arts. The resolutions also condemned those manufacturers who have taken advantage of the imposition of the tax to raise the price of their preparations greatly in advance of the amount of the tax imposed on them,

and commended those manufacturers who have refrained from adopting such a course.

The movement started recently among retail druggists in the West to form an association which shall have for its object the furtherance of the commercial interests of its members came up before the Commercial Section in the shape of a proposition that delegates be sent by the Association to the proposed convention to form the new association, which will be held at St. Louis, on October 17th. The matter was referred to a committee, which reported, through Prof. Joseph P. Remington, of Philadelphia, the following resolution: "While it is not in the power of the Association to officially aid the organization of the proposed retail druggists' association, whose call for a convention is based on the advance in prices of proprietary and patented preparations, this Association heartily desires the success of every organized effort of retail druggists which will protect their commercial and pecuniary interests."

THE FINAL GENERAL SESSION

of the Association was held on Saturday afternoon. Various items of business were transacted, and the officers for the ensuing year installed. The meeting then adjourned, the members fully appreciating that it has been one of unusual success. The amount of work accomplished—in business transacted, papers read, etc.—has been equal to, if not greater than at any previous meeting, notwithstanding the hot weather. The Sections on Science, and Education and Legislation are to be congratulated on the merits of the papers presented, and the excellence of the discussions. The Commercial Section has been resurrected, and it is apparent may be a useful department to the Association. The sociable features were admirably carried out. It is doubtful if the members of the Association have ever enjoyed such generous hospitality and unbounded interest in their welfare, as was shown by the Committee of Arrangements. After the Session some of the members went for short excursions to various points, while the majority returned to their homes with the pleasant memories of a most enjoyable and profitable Convention.

OBITUARY.

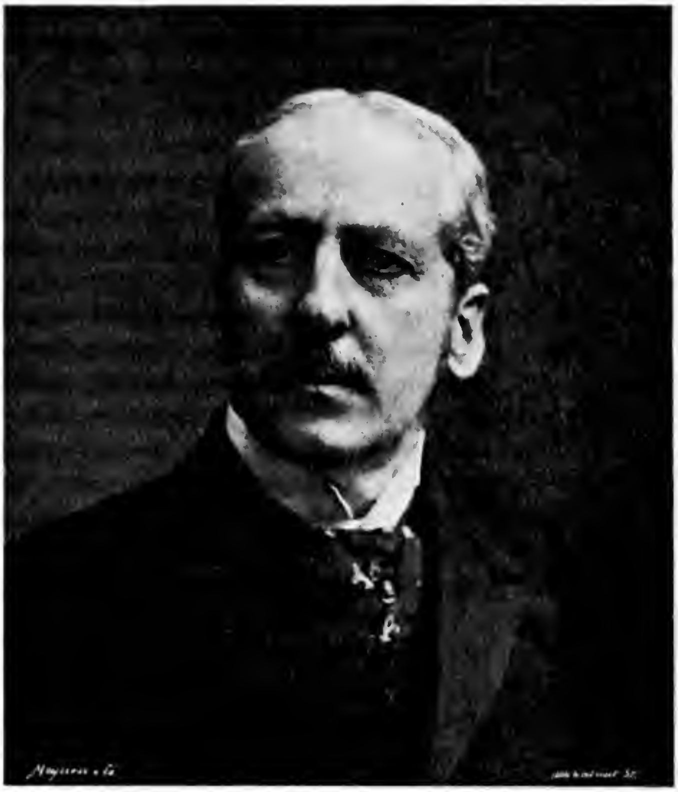
William Pepper, M.D., LL.D., who was distinguished as one of the most eminent physicians of this country, and also as a man of enlightened public spirit, died of angina pectoris, at Pleasanton, Cal., on July 28th, where he had gone for rest and recreation.

Dr. Pepper was in the fifty-fifth year of his age, having been born in Philadelphia, on August 21, 1843. He was the son of Dr. William Pepper, a distinguished physician of his day. He was educated at the University of Pennsylvania having graduated from its Collegiate Department in 1862, and from its Medical Department in 1864. Soon becoming identified with the work of the University he was lecturer on Morbid Anatomy, from 1868 to 1870, and on Clinical Medicine from 1870 to 1876, and professor of the latter subject from 1876 to 1881, when he was elected to succeed Dr. Alfred Stillé in the Chair of the Theory and Practice of Medicine, which position he held until the time of

his death. In the same year he became Provost of the University and held this position until 1894. Under his administration the University made rapid material progress, and in addition eight new departments were created.

Dr. Pepper was also noted as a voluminous writer, his most important work being a "System of Medicine by American Authors," published in 1885–1886.

We have not the space to enumerate the various public works with which he was affiliated, but quote the following from the *Philadelphia Medical Journal*, in its issue of August 6th, as summarizing in some measure his varied interests:



LOANED BY MEYNEN & CO., PHILA.

"In the death of Dr. Pepper, the city of Philadelphia has lost a most public-spirited citizen, the medical profession a most distinguished representative, the cause of education and of art a most liberal patron and advocate, and the University of Pennsylvania a loyal, sincere and self-sacrificing friend."

Phosphorescence of Decaying Wood is not chemical, as supposed, but of vegetable origin. The mycelium of a fungus from pine has been cultivated in a decoction of beech bark and agar-agar, the result being a white, brilliantly-luminous growth.—*Amer. Month. Micros. Jour.*

The Use of Rœntgen Rays, in detecting the adulteration of gum opium with lead balls was employed by A. Tschirch. In the one he found a large lead ball, whereas in the other there were smaller lead balls.—*Schweiz. Woch. f. Chem. u. Pharm.*, 1898, p. 219.

THE AMERICAN
JOURNAL OF PHARMACY

OCTOBER, 1898.

ANALYSIS OF THE RHIZOME OF ARALIA CALIFORNICA.

By William R. Monroe, P.C.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 179.

Aralia californica is an herbaceous perennial which grows from creeping rhizomes. In *Fig. 1* is an illustration of one of these rhizomes. The plant is common in shaded mountain ravines of the Coast Range, from the Gavilan Mountains, northward; it is also found in Sierra County, California. It prefers rich soil and an abundance of moisture, and grows more luxuriantly along streams. It could be obtained in commercial quantities, if desired.

The rhizomes used in this work were collected by the Experimental Bureau of the University of California.

They were in a very moist condition when received; and, as they had an aromatic odor, it was deemed best to make the determinations upon the material as received. Accordingly some of the finely chopped material was exhausted by maceration with successive portions of official alcohol. The alcoholic liquids were mixed, and the solvent removed from the dissolved substances by distillation. The percentage amounts are all based on the fresh rhizome, which contained 70·20 per cent. of moisture.

The official alcohol extracted 5·39 per cent. of the fresh rhizome. The extract was of a reddish-brown color. About two-thirds of it was soluble in hot water. The aqueous solution had a neutral reaction toward litmus. It contained sugars equivalent, in their action on Fehling's solution, to 0·23 per cent. of glucose and 0·13

per cent. of saccharose; smaller quantities of mucilage were also present. The aqueous solution contained a substance which reduced gold and silver salts, and precipitated calcium hydrate; this substance was very probably oxalic acid, the occurrence of considerable quantities of which, as calcium oxalate, is hereafter noted. Tannins were absent. The aqueous solution afforded heavy brownish pre-

FIG. 1.—Rhizome with roots and part of overground stem of *Aralia Californica.*

cipitates with phosphotungstic acid, potassium triiodide, and mercuric potassium iodide test solution, but the substance causing these reactions, could not be removed by agitating the aqueous solution, either acidulated or made alkaline, with benzin, ether, or chloroform; hence they were not alkaloids. The substance which precipi-

tated with the alkaloidal reagents was thrown out of solution upon adding to the aqueous liquid five times its volume of alcohol.

The residue of the alcoholic extract of the fresh rhizome left undissolved by water was dissolved in hot alcohol. It consisted chiefly of resinous substances. These gave a light-brown precipitate with an alcoholic solution of ferric chloride, and a similar, but lighter colored, precipitate with alcoholic solution of lead acetate. The resinous substances were precipitated when the alcoholic solution was poured into water. The precipitated substances were soluble in part in aqueous solution of potassium hydrate; the remainder was soluble in an alcoholic solution of the same reagent.

That portion of the recent rhizome which was insoluble in official alcohol was submitted to Dragendorff's scheme of plant analysis. The process revealed the presence of a small quantity of a fat or wax saponifiable by alcoholic solution of potassium hydrate. A small amount of resin was also present. Mucilage and albuminous matter were found in the aqueous extract to the extent of 0·75 per cent., and in the alkaline aqueous extract to the amount of 0·98 per cent. Minute quantities of dextrin, glucose and saccharose were present. Pararabin and a very considerable amount of calcium oxalate were found in the acidulated water extract. The calcium oxalate separated as crystals, when the acidulated water, which was a weak hydrochloric acid, was evaporated. The crystals were needle-shaped, and arranged themselves in stellate groups.

When received the rhizome contained 70·20 per cent. of moisture and 2·22 per cent. of ash. The ash consisted of potassium carbonate, chloride and sulphate, and calcium, magnesium, aluminum and iron, in the form of carbonates and phosphates. A small amount of silica was also present.

The odor of the rhizome caused a special search to be made for volatile oil. For this purpose, 1 kilogramme of the fresh material was finely chopped, placed in a still, and, after allowing it to macerate with water over night, heated with the water. A very small amount, less than 2 c.c., of volatile oil collected in the receiving vessel. The liquid which came over with the oil was neutral to litmus. The oil had a pale-yellow color, and a very aromatic odor; the latter resembled the odor of carrots. Upon standing, the odor of the oil became more pleasant. The oil floated on water. It was soluble in alcohol.

Starch was found in the rhizome. An estimation of it made on the fresh material showed 1·67 per cent.

A special examination of a kilogramme of the rhizome for saponin was made by the method of Christophsohn and Otten, but the principle was not found.

NOTES ON ESTIMATING EUCALYPTOL.[1]

By Lyman F. Kebler.

From the great variety of oils of eucalyptus met with in commerce, it would seem that each species (about 120) of the Eucalyptus genus, yielded a distinctively characteristic oil. Just how to differentiate the officially recognized oils from the undesirable material is not an easy task; especially when it is remembered that the U.S.P. recognizes the oils distilled from the fresh leaves of *Eucalyptus globulus*, Labillardiere; *Eucalyptus oleosa*, F. v. Müller, and some other species of *Eucalyptus*.

The specific gravity is a valuable indicator when the oil is "straight," but the oils can be so mixed as to render this factor of little service. The same is true of the rotatory power. The phellandrene test is of considerable service, but what is wanted, after all, is the amount of eucalyptol in the oil.

In 1894 Mr. L. R. Scammell[2] took out a patent for the preparation of eucalyptol on a large scale. The basis of this patent is the property of eucalyptol to form a crystalline compound with phosphoric acid of a certain strength. The process consists in adding concentrated phosphoric acid (Sp. Gr. 1.75 to 1.785, preferably the latter), in slight excess, to the oil at the ordinary temperature, but not above 60° F. The eucalyptol phosphate crystallizes out, is purified by pressure or centrifugally, and is then decomposed with hot water.

Just how far this process will lend itself to quantitatively estimating eucalyptol is fairly well settled. Mr. Faulding, commenting[3] on the method, lauds it to the skies, but does not give any data for his affirmations. Mr. Helbing,[4] on the other hand, considers the

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[1] Read at the Baltimore meeting of the American Pharmaceutical Association.

[2] 1894, Eng. Pat., No. 14,138, July 23d.

[3] 1895, *Chemist and Druggist*, 46, 310.

[4] *Pharm. Record*, No. 33, p. 26.

method valueless for quantitative work. It is with the latter that the writer's experience coincides. For estimating eucalyptol the method is unsatisfactory, but as a means for detecting the presence of eucalyptol in the oil, it is of much service. This is good so far as it goes, but the all-essential, how much, is lacking.

The writer has made some experiments along another line that may be of interest. The eucalyptol phosphate is obtained by cooling the oil in ice-water, gradually adding half its volume of phosphoric acid, with agitation, cautiously keeping cool. The contents of the beaker can readily be kept cool as follows: Add the acid to the oil, cool the mixture in ice-water, then slowly agitate with a glass rod until uniformity results. After preparing the eucalyptol phosphate, it is purified between folds of filter paper by means of heavy pressure. This portion of the work having been *well* done, the solid mass ought to consist of eucalyptol, phosphoric acid and traces of water and oil constituents, aside from eucalyptol. By weighing this addition product we have the combined amount of eucalyptol and phosphoric acid. Now, by treating the eucalyptol phosphate with hot water, decomposition results and the phosphoric acid can readily be estimated by titrating with a volumetric solution of potassium hydroxide. The eucalyptol is easily obtained by difference.

The method as executed by the writer, is as follows: 8 grammes of the oil are weighed out in a suitable beaker, cooled in ice-water, 4 c.c. of phosphoric acid (1·75) added and again placed in ice-water. After cooling, the contents of the beaker are slowly and thoroughly mixed by means of a glass rod, the eucalyptol phosphate removed, purified by pressure, weighed, decomposed with hot water, and the acid estimated by means of a standard alkaline solution. Of course it is understood that smaller quantities can be worked with. It is necessary to add more of the phosphoric acid in some cases. This is true in the case of pure eucalyptol. Twice the above amount was added for the results obtained in this paper.

The result obtained by the above process for pure eucalyptol and a number of oils are given in the table below. Other data are also included.

Number.	Specific Gravity at 15° C.	Grammes of solid Eucalyptol Phosphate.	Per cent. of Eucalyptol, by Difference.	Per cent. of Eucalyptol, Direct.
1	0·9350	14·78	103·75	62·14
2	0·9153	10·70	73·62	31·20
3	0·9116	8·10	54·75	23·17
4	0·8912	7·13	43·62	24·29
5	0·8955	3·50	23·37	—
6	0·8876	Did not congeal	—	—
7	0·9081	Did not congeal	—	—
8	0·9424	9·9	73·84	49·23

No. *one* was pure eucalyptol. Nos. *two* and *eight* were marked fancy oils, and commanded a high price. The remaining oils are such as are commonly met with in the wholesale trade.

The solid eucalyptol phosphate was obtained from 8 grammes of substance. The per cent. of eucalyptol by difference was obtained by the above process. The per cent. of eucalyptol, direct, was obtained by Mr. Scammell's process.

The above method does not give absolute results, as can readily be seen from the amount of eucalyptol, in pure eucalyptol, but the results are close approximations. The method will undoubtedly be of service, being short and easily executed.

35 Poplar Street, Philadelphia.

ANALYSIS OF LEMON SYRUPS.[1]

By A. Borntræger.

For the detection of sulphuric, hydrochloric and boric acids a solution of the sample was evaporated with soda, and the residue charred. One portion of the aqueous extract of the residue was then acidified with hydrochloric acid, and a second portion with nitric acid, and the two portions tested respectively with barium

[1] *Zeitschr. f. Untersuch. der Nahr. u. Genussmittel*, 1898, p. 225; abstract in *The Analyst*, 1898, p. 176.

chloride and silver nitrate. A third portion was acidified with hydrochloric acid and tested for boric acid with turmeric paper.

Oxalic acid was tested for by heating an aqueous solution with neutral calcium acetate. For the detection of salicylic acid an aqueous solution was shaken with chloroform, the chloroform removed and filtered repeatedly through dry filter-paper until clear, evaporated, the residue taken up with water, and a dilute solution of ferric chloride added.

The heavy metals were tested for by sulphuretted hydrogen and ammonium sulphide. The total acidity was determined by titration, and from the result that due to tartaric acid was deducted, the remainder being reckoned as citric acid.

The tartaric acid was determined by precipitating as acid potassium tartrate and titrating. To a solution of 20 grammes of the syrup was added 5 grammes of potassium chloride, the solution neutralized with solution of potash and made up to 50 c.c. A solution of 5 grammes of citric acid was then added, the solution stirred, allowed to stand over night, the precipitated acid potassium tartrate washed, first with a saturated solution of cream of tartar, and afterwards twice with a 10 per cent. solution of potassium chloride, and finally titrated hot.

For the detection of soluble starch, gum and dextrin, a moderately strong solution was mixed with six times its bulk of absolute alcohol, the alcohol removed, the residue dissolved in water, and alcohol again added, and the same procedure repeated until the residue contained nothing further of a reducing nature. The residue was then dissolved in water, boiled for fifteen minutes with hydrochloric acid, neutralized and tested with Fehling's solution.

For the detection of gelatin an aqueous solution was tested direct with a solution of tannin. As, however, the presence of much citric acid hinders the precipitation, it is advisable to first neutralize with soda. The presence of an excess of soda, on the other hand, redissolves the precipitate.

For the determination and identification of the sugar, a solution was made by dissolving 5 grammes in 100 c.c. of water. For the determination of the reducing-sugar 25 c.c. of the solution were neutralized with soda and diluted to 100 c.c. Ten c.c. of Fehling's solution and 40 c.c. of water were then added and the titration carried out according to Soxhlet's directions. As the solution of the

syrup polarized to the right, and contained no saccharose, the results were reckoned as dextrose. The method used for the detection of saccharose depends upon its inversion by hydrochloric acid. Twenty-five c.c. of the 5 per cent. solution were allowed to stand over night with 2·5 c.c. of hydrochloric acid of 1·1 specific gravity, the solution neutralized with soda, made up to 100 c.c. and titrated. The polarimeter, however, showed that no reducing sugar had been formed, and therefore no saccharose was present in the sample. Though the 5 per cent. syrup solution showed on the day after its preparation, a rotation of + 21·9 Ventzke (length of tube = 2 decimetres), only 1·5 per cent. of dextrose anhydride, corresponding to a rotation of + 4·9 Ventzke, had been found. This led the author to suspect the presence of very impure starch-sugar containing amylin, which was confirmed in the following way: Ten grammes of the sample were dissolved in water, neutralized while hot with precipitated calcium carbonate, filtered hot, the precipitated calcium citrate with the excess of carbonate washed with boiling water, the filtrate cooled and fermented with must. It was then neutralized while hot, evaporated, treated first with lead acetate and then with sodium sulphate, made up to 100 c.c. and filtered. The liquid showed after four hours as well as after twenty-four hours a rotation of + 21 Ventzke = + 7° 17′ (2 decimetre tube), whilst its power of reducing was equal to 0·65 gramme dextrose anhydride in 100 c.c., corresponding to + 2 Ventzke.

The glycerin was tested for by the German official method for the analysis of dry wines, but none was found.

In analyses of lemon-juice the following results were obtained:

LEMON SYRUP.

100 Grammes contained	I.	II.	III.
Citric acid	6·75	14·40	5·42
Tartaric acid	10·58	Nil.	10·70
Reducing-sugar reckoned as dextrose	—	30·10	38·42
Saccharose	—	Nil.	Nil.
Amylin	—	Present.	Present.
Total extract	—	81·92	80·56
Extract minus citric and tartartic acids and reducing-sugar	—	37·42	26·02
Mineral matter (ash)	—	0·32	0·72
Polarization, Ventzke (length = 2 decimetre tube)	—	+ 21·9	+ 19·0

LEMON JUICE.

100 Grammes contained	Ripe Fruit.	Unripe Fruit.
Citric acid, calculated from acidity	7·25	7·70
Citric acid, precipitated as calcium salt	7·28	7·52
Tartaric acid	Nil.	Nil.
Reducing-sugar	0·75	0·21
Saccharose	0·19	0·78
Ash	0·384	0·486
Total extract	8·87	9·30
Extract minus citric acid and varieties of sugar	0·68	0·61
Observed rotation	— 1·7 (— 0° 36′)	+ 1·3 (+ 0° 27′)
Polarization corresponding to the saccharose	+ 0·7	+ 3·0
Polarization of the reducing-sugar { found	— 2·4	— 1·7
Polarization of the reducing-sugar { required	— 0·9	— 0·26

THE COTTON-SEED OIL INDUSTRY IN GEORGIA.[1]

By Joseph Jacobs.

I have thought that our Association, in this section especially, might profitably from year to year devote some of its time to the consideration of some of the industries that produce the articles that form or which might form the subject-matter of the drug trade, directly or indirectly.

In the present paper I shall endeavor to give some account of the cotton-seed oil industry, confining the statistical portion of the article mainly to my own State, Georgia, as this is one of the typical Southern States, and what is said in that connection is measurably true of the other Southern States of our Union; though the industry is by no means confined to the South.

While the Southern States of our country now principally supply the world with cotton, the cultivation of the plant is not at all confined to that section. Egypt, India, Australia, portions of China and many of the States of South America, as well as many of the islands of the seas, cultivate the variety of the Gossypium plant, known by the common English name "cotton."

There are some who suppose that the use of cotton as a mate-

[1] Read at the Baltimore meeting of the American Pharmaceutical Association.

rial for fabrics began with the introduction of slavery in this country, but the history of the plant shows that many of the ancient nations were skilled in the weaving of cloths from this fleece of the fields, and authoritative writers state that long before the Christian era, the older peoples of the East could weave it into filmy fabrics of far more delicate texture than even those of the finest of this day.

It is said that the value of the seed known to the ancients was both in the oil and the meal; that the oil was used, but not for its edible purposes, and that the crushed seed were fed to their cattle. The Chinese, it is related, expressed the oil from cotton seed at least 500 years before Christ.

In England there are now about twenty-five oil mills in operation, consuming principally black seed of the sea-island plant transported in ships from Egypt, and the Hollanders are, perhaps, as largely engaged in the industry. The oil has been made in those countries for many years.

The superiority of the oil made in our Southern States is due partly to the fact that the seeds can be secured fresh from the fields, near the oil plants, whereas in England and Holland some months are often required to bring them over in sailing vessels. Besides, the English and Holland oil is not so clear as ours, because the seed there treated is Egyptian or Indian, and is not decorticated, owing to the difficulty of picking it. Our cotton-seed parts with its fibre more readily, and in every way yields better to treatment.

The first mill for the manufacture of the oil in this country was, perhaps, the one near Columbia, S. C., mention of which is found as early as 1826; though it was probably operated prior to that date. One of the mills in New Orleans before the war used a 35 horse-power steam press, producing 500 gallons of oil and 5 tons of oil cake a day. It required, as stated in the *Southern Farmer and Planter*, about 15 tons of cotton-seed to produce this amount of oil and cake, or each ton yielded about 40 gallons of oil and 700 or 800 pounds of cake. In Memphis, Tenn., it was also made in large quantities. At this period we find the following published statement of the uses of the oil: "This oil, refined by a secret process, is made of two qualities—the best used for illuminating and lubricating purposes and for currying leather, and the inferior

for making soap equal to the palm soap." Cotton-seed cake was then considered of about equal value with flax-seed cake.

Prior to the war the cotton seeds were very little used as a stock feed. Some farmers sparingly used them after boiling. They were abundantly applied as a manure, but only in their uncrushed condition. Browne, in his "Field Book of Manures," says: "They abound in a mild oil, and are accounted very nutritious after the oil is expressed, a bushel of seeds weighing 30 pounds, and yielding 2½ quarts of oil and 12½ pounds of fine meal. The oil cake is very brittle, and breaks down much more readily than linseed cake. The taste is not unpleasant, and it is stated it can be used with success in fattening stock."

In the Patent Office Reports, 1855, p. 234, can be found "some chemical researches on the seed of the cotton plant," by Prof. Chas. T. Jackson. He refers to a patent taken out by D. W. Mesner for separating the "hulls" from the cotton-seed. Analyses are given of the oil, the seed, the cake, etc. Professor Jackson employed ether to separate the fixed oil, and it was found that 100 pounds of the dried, pulverized seed gave 40 per cent. of pure, fatty oil. The specific gravity of the oil is given as 0·923, which, he states, is the specific gravity of pure whale oil. He recommended its use for lubricating machinery, burning in lamps and for making soaps, and suggested its use as a substitute for olive oil and use as a salad oil, it having no disagreeable odor or taste. On examining the cotton-seed oil cake, he found that it possessed "a sweet and agreeable flavor, and was much more pure and clean than linseed oil cake." One hundred grains of the seed leave 60 grains of the oil cake. This cake examined for sugar was found to contain 1·1 grains, and for gum 35 grains. Iodine gave no proof of any starch in the cotton seed, nor in the oil cake.

Since the war, the cotton-seed oil industry of the South has grown to immense proportions. The number of mills has increased from four in 1867 to over 300 at the present day. In 1872 the export of cotton oil only amounted to 4,900 barrels; in 1896 about 30,000 barrels, and the present product amounts to about 28,000,000 gallons per annum, worth about 30 cents per gallon, causing the consumption of about 800,000 tons of cotton seed. The product goes to nearly every European port, to Africa, Australia, India, the South American Republics, West Indies and Canary Islands

and Japan. The Germans and Americans are said to prefer animal fats to vegetable oils, contrary to the taste of all other civilized people. The capacity of the various mills varies from a consumption of 250 tons a day by the larger mills to 15 tons by the smaller. The total capacity of the Georgia mills is about 2,000 tons a day, which, if run on full time, would consume more than the total seed product of that State if all were available; but the fact is that much of the seed used by the Georgia mills is brought from Alabama, Mississippi, Florida and the Carolinas. The annual output of Georgia from the 200,000 tons of seed, is about 150,000 pounds of oil, 70,000 tons of meal, 8,000 bales of linters and 80,000 tons of hulls. The average value of the annual product is about $2,750,000.

I have thus endeavored to give some of the facts connected with cotton-seed oil, its history and its quantity and production, in the hope that our trade may find it a profitable product to deal in. I will now enumerate some of the uses to which it has been applied, hoping that they may suggest others even more in line with our especial interests.

The principal use to which it is put is for food purposes. The claim that it is more healthful than many animal fats has been largely responsible for its extensive adoption in this connection. Nearly seven-eighths of the 28,000,000 gallons produced per annum probably find their way into "refined lard" and salad and cooking oil. It is used for illuminating, in the manufacture of bolts and nuts; for all kinds of soap, bath, laundry and toilet soap. It is used as a substitute for olive oil as an emulsion in medicine; it has been prescribed as a substitute for cod-liver oil, and for olive oil in packing sardines, and in many other ways. It is said that its non-drying properties debar its use as a wood filler, or for stuffing hides in making morocco and other leathers. No treatment has as yet been discovered which will give it the "drying" properties of a good menstruum for paints. As a soap for woolen mills, it has been extensively adopted in America, England and Scotland.

As an illuminant, a writer claims that its place is midway between sperm and lard oil. It can be burned alone or mixed with petroleum. On the coast of Maine there are a number of establishments shipping "sardines" and "shadines," which are said to be cooked

and then placed in boxes containing cotton-seed oil; and it has been charged that of the immense quantity of sardines exported from France and other European countries, largely more than three-fourths are now treated with cotton-seed oil instead of olive oil, as was formerly the exclusive practice. It has been suggested that the oil could be used in candle-making and for steel tempering.

By the time of the next meeting of our Association, I trust that this abundant and interesting American product may be fully treated by some of our members in a paper from a scientific standpoint, in which many new and valuable pharmacal uses may be pointed out.

GILLENIA TRIFOLIATA.[1] (INDIAN PHYSIC.)[2]

The histories of plants are not complete without an account of the personalities connected with them. Indeed, the individuals who have had part in bringing to our special notice a plant or its relations to humanity, seem to us as if they were an essential part of the whole story. Very often the generic or specific name of a plant is given in honor of some individual, and we naturally desire to know in what respect he deserved the honor. *Gillenia* would seem, from its construction, to be the Latinized form of some one's name; but no satisfactory explanation has been offered. The plant, itself, has been long known to botanists, as it was among those sent to Europe, in 1680, by the Reverend John Banister; but it was classed with the *Spiræa* family; at least, to that section of the *Spiræa* family known, at that time, as *Ulmaria*. Morison, who published a history of plants, in 1715, before the binomial system was introduced by Linnæus, described it as *Ulmaria Virginiana trifolia, floribus candidus amplis longis et acutis*, and Linnæus, himself, having in his earlier works united *Ulmaria and Spiræa*, describes it as

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[1] *Gillenia Trifoliata*, Moench, natural order, Rosaceæ.—Leaflets ovate-oblong, acuminate; stipules linear-setaceous, entire; flowers on long pedicels, in pedunculate, corymbous panicles. A handsome herb, two to three feet high, slender and nearly smooth; lower leaves petiolate; leaflets two to four inches long, one-third as wide, pubescent beneath, sub-sessile. Flowers axillary and terminal. Petals rose-color or nearly white, eight lines long by two wide. Seeds brown and bitter. Wood's *Class-Book of Botany*. See also Gray's *Manual of the Botany of the Northern United States*, and Chapman's *Flora of the Southern United States*.

[2] *Meehans' Monthly*, 1898, p. 127.

Spiræa trifoliata, foliis ternatis serratis subæqualibus floribus subpanicalatis. In establishing the binomial system, his evident practice was to retain the first or last term for his specific name. Though not always appropriate, this method preserved the connection of the plant with its earlier history. In this case, the term *trifoliata* is sufficiently appropriate. It continued as *Spiræa* until 1802, when Conrad Moench, in a supplement to a local flora of the city of Marburg, in Austria, noting its tubular campanulate seed vessel, included stamens, and its peculiar carpels, named it *Gillenia*, as distinct from *Spiræa*, which determination has been accepted by subsequent botanists. But why he named it *Gillenia*, has been a matter of doubt. The author of this chapter has not had access to the original work of Moench. Indeed, beyond the fact that he was a Professor of Botany somewhere in Hesse Cassel, and that he was the author of a few local Floras, little is known of him. Of Gillen, if there ever was a person by this name, nothing is known. Paxton, in his Dictionary, says, the plant was "named by Moench, probably after Gillen, some obscure botanist." The always-careful Darlington says, "Derivation of the name not well ascertained." Dr. Asa Gray has it that it was "dedicated to an obscure German botanist or gardener, A. Gille, or Gillenius." The "Century Dictionary" enlarges a little on this and says, "named after Dr. Arnold Gill (Latinized Gillenius), a German botanist;" and it gives the pronunciation Ji-lé-ni-a. There are good philological reasons against the latter suggestions. Wood brushes away the whole line of argument, and suggests the derivation from a Greek word signifying hilarity, from the well-known use of the plant by the Indians, but even here the orthography—two l's being employed in the name—is against the conjecture. It is most reasonable that the genus was named *Gillenia* in honor of some good cultivator of plants at Marburg. The city was, in Moench's time, a famous seat of learning, with reputable schools and colleges; while the gardens of its citizens were filled with rare plants from many countries.

The *Spiræa trifoliata* was, in the language of Sims, "a plant much coveted, increasing but little, propagated with difficulty, and liable to be lost unless placed in soil and situation highly favorable to it. It is scarce in the gardens about London." This was in 1796. Moench was writing a *Methodus* or arranged account of the plants found in the fields and gardens of Marburg—and there is

FIG. 1.—Lower portion of a flowering stem of gillenia trifoliata, from a plant growing on the Wissahickon, near Philadelphia.

little difficulty in believing that he would name the plant in honor of the one in whose garden the rare opportunity of examining it was afforded. May we not say "*Gillenia*—in honor of a grower of rare plants at Marburg in Austria?"

In recent times trouble has arisen in regard to the names of plants from the fact that species, supposed to be distinct and named as such, have been referred subsequently to one species. In these cases the rule proposed was that the oldest name should prevail. But in many cases the newer name has widely prevailed before the older was noted. The recent effort has been to insist on the older name, and a new rule proposed that a name once used should not be employed again. As it is expressed "once a synonym, always a synonym." The current is not running smoothly in this direction, and our plant has been dragged into the whirlpool. In Britton and Brown's recent work, the "Illustrated Flora of the Northern States," *Gillenia* is dropped, and it appears as *Porteranthus;* the name being given by Prof. Britton in honor of Prof. Thomas C. Porter. The reason given for this is that Adanson gave the name *Gillena* to a genus which proved to be the same as *Clethra*. *Gillena* thus became a synonym which Britton and Brown regard as ineligible. But even under this rule the change seems unjustifiable. *Gillena* is not *Gillenia*. If a difference in spelling, though but in a single letter, is to make a name synonymous, many changes will have to be made in other things. The new name, *Porteranthus* might even be questioned, as *Porterella* has been employed before, though, to the regret of all who would see Professor Porter's eminent services to botany honored, it has been pronounced synonymous with another campanulaceous plant. *Gillenia* will probably prevail for our plant.

As already noted, it was known to English botanists early in the seventeenth century; but cultivators, according to a reference in "Philosophical Transactions," n. 337, p. 214, n. 134, are indebted to the famous amateur gardener, Henry Compton, Bishop of London, in the garden of whose palace at Lambeth it was found growing at the time of his death, in 1713.

The common name, "Indian Physic," refers to its use among the Indians. Some authors say that it was customary for some tribes of Virginia Indians to meet together once a year, and go through a regular system of purification, accompanied with peculiar religious

services. At these times, the pounded root of this plant was the chief emetic. Clayton to Gronovius, in his report on Virginian plants, says it is "Ipecacuanha, or Indian Physic." As Ipecacuanha is believed to be a Brazilian term, signifying a "sick-making" plant, it is probably an application by the white settlers to this plant. It would be a connecting link between the Virginia Indians and those of South America, if this term were common to both. In noting its properties, Griffith says, in "Medical Botany," "It early attracted the attention of botanists, who found it well known to the Aborigines as a certain and safe emetic. It is a curious fact, connected with our *Materia Medica*, that there is scarcely any plant having remedial powers with which the Indians were not well acquainted before any communication with the whites; while there is scarcely one indigenous remedy that has been the result of scientific research"—a remark that may be applied to many things besides medical knowledge. In regard to its worth, Dr. Griffith says that, after Baum had regarded it as of no merit, he examined it carefully, and concluded that there could be no doubt of its value. The dose given is thirty grains, persisted in till vomiting takes place.

Besides Indian Physic, a popular name is "Bowman's Root"—not from any individual of that name, but as synonymous with Indian—the man who uses the bow.

When growing in large masses, as it is occasionally found, it does not present the same pretty effect as when individual plants are growing among sedge-grasses, ferns and other green vegetation. The light color of the flowers, amidst so much verdure, then shows to great advantage. This is the condition in which it is generally found. It occurs sparingly beyond the Alleghanies. It seems most at home in New York, Pennsylvania and thence to Virginia, becoming scarcer till Northern Alabama is reached, which seems its southern limit.

A New Morphine Derivative.—Merck prepares benzyl morphine by the action of benzyl chloride on morphine in the presence of alkali in alcoholic solution. The resultirg benzyl morphine is converted by HCl into the hydrochloride. This new salt forms shining prisms, soluble in most organic solvents. Its formula is $C_{17}H_{18}NO_2.O.CH_2C_6H_5HCl$. It is suggested as a substitute for codeine (methyl morphine).=*Brit. and Col. Drug.*, 1898, p. 773.

QUALITATIVE EXAMINATION OF POWDERED VEGETABLE DRUGS.[1]

By Henry Kraemer.

In this communication is embodied the principles of a scheme for the determination of unknown powders. While the paper has primarily to do with the consideration of *official vegetable drugs*, still it has been found necessary to incorporate with it also the important *non-official vegetable drugs* and *food products*, as well as the *pulveres* (composed of inorganic and vegetable substances), some of the *compound powders* for making various preparations, and all of the principal *plant constituents*, as opium, guaiac resin, etc. The proximate principles of plants, other than starch, have been omitted, owing to the fact that they require a somewhat different treatment. Somewhere in the neighborhood of 300 powders are considered. The whole scheme is but tentative, and will doubtless require some changing, but gives us a basis for subsequent work, at least. It has not been possible, up to the present time, owing to the pressure of duties, to finish the drawings for publication of the points considered, but even without these, those who are familiar with the microscopical characteristics of crude drugs and the general principles of chemical analysis will find little or no difficulty in the utilization of the same. The drugs under consideration are divided, according to the varying shades of color, into seven classes:

I. Color, some shade of light green to gray.

II. Color, nearly white.

III. Color, some shade of yellow.

IV. Color, varying from some shade of tan or ecru to dark brown, or even dark blue or black.

V. Color, some shade of red.

VI. Powders that vary in fineness from Nos. 20 to 30 or less, and are with difficulty examined by means of the microscope without further treatment, as sectioning, etc.

VII. Drugs that do not occur in the powdered condition.

The author was some time in coming to the conclusion that powdered drugs could be arranged along color lines before taking them up scientifically for identification. It is true it is necessary to arrange samples of the powders in convenient vials and mount on white cardboard to appreciate the ground for the classification

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[1] Given in abstract at the Baltimore meeting of the A.Ph.A.

adopted. It will also be found that there are a few of the powders under the different groups, as No. I, that might be considered advantageously under others, as No. IV. In such cases samples must be arranged under both, and this has been done as far as possible by the author.

The largest groups are Nos. I and IV, and it will be found that they include a more natural grouping than we would at first suppose. Under No. I we find chiefly the herb and leaf drugs, while under No. IV are chiefly roots, rhizomes and barks. It has been found necessary, owing to the difference in predominating constituents or tissues, to work up each group differently.

GROUP NO. I. COLOR GREEN TO GRAY.

Coca, Buchu, Mentha viridis, Matico, Chelidonium, Guaiaci resina, Gaultheria, Lobelia (herb), Passion flowers, Pulsatilla, Pilocarpus pinnatifolius, Lobelia (leaves), Buchu (long), Calumba, Eucalyptus, Absinthium, Pilocarpus, Senna (Alexandria and India), Scutellaria, Castanea, Eupatorium, Tanacetum, Mentha piperita, Lobelia, Anisum, Fœniculum, Conium, Belladonnæ folia, Coca, Insect powder (Persian), Salvia, Eriodictyon, Hamamelis, Matico, Uva ursi, Scoparius, Grindelia robusta, Chimaphila, Gaultheria, Hyoscyamus, Stramonii folia, Galla (Chinese or Japanese), Cypripedium, Aletris, Digitalis, Marrubium, Piper nigrum, Ergota, Hedeoma, Sarsaparilla (Mexican), Cimicifuga, Spigelia, Leptandra, Arnicæ radix, Chenopodium, Sarsaparilla (American), Xanthoxylum fraxineum, Xanthoxylum Americanum, Aralia spinosa, Senega, Sarsaparilla (Honduras), Sumbul, Taraxacum, Serpentaria, Piper album, Aurantii amari cortex, Aurantii dulcis cortex, Limonis cortex, Helonias dioica, Caulophyllum, Angelica, Kava kava, Nux vomica, Belladonnæ Radix.

I. WITHOUT FIBRO-VASCULAR TISSUE.

1 *Ergota.*—Oil globules; red or violet coloration in chloral and sulphuric acid; odor.

II. WITH FIBRO-VASCULAR TISSUES.

A. WITH CALCIUM OXALATE CRYSTALS.[1]

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[1] If there are any doubts about the presence of calcium oxalate crystals, sulphuric acid may be added to the powder when numerous needle-shaped crystals of calcium sulphate will generally separate. It must be also stated that in plants containing calcium oxalate the form may be in needles in addition to the characteristic form given.

a. CRYSTALS ROSETTE OR STAR-SHAPED.

a. *Containing starch.*[2]

2. *Aralia nudicaulis.*—Crystals 35-70 μ; starch, 10–15 μ; secretion reservoirs (yellow and brown); sklerenchyma.

3. *Aralia spinosa.*—Crystals about 50 μ; starch about 10 μ; reservoirs containing oil and resin; cork brownish; sklerenchyma fibres; also sometimes fine needle-shaped crystals.

4. *Galla* (*Chinese or Japanese*).—Few crystals, 20 μ; starch 40 μ; non-secreting hairs; milk vessels accompanying ducts; mounts in glycerin show acicular crystals of gallic acid.

5. *Passion Flowers.*—Crystals 15 μ; starch; pollen 35–45 μ; sklerenchyma.

6. *Podophyllum.*—Crystals 50 μ in diameter; starch 5–8 μ diameter; single grains to 2–6 compound; numerous single or groups of cells colored yellow; sklerenchyma fibres and ducts.

7. *Spigelia.*—Crystals 5–15 μ; starch 4 μ; parenchyma and long light colored sklerenchyma fibres characteristic; apparently at one stage or in an admixed drug calcium carbonate is present

β. *Without starch.*

8. *Anisum.*—Crystals 2–3 μ in aleuron grains 6 μ in diameter; non-secreting hairs; secretion reservoirs; epidermis of seed coat and pericarp characteristic.

9. *Buchu.*—Crystals 15–20 μ; sphere-crystals of a carbohydrate 35 μ; mucilage; sklerenchyma very characteristic; non-secreting hairs; heavy cuticle; oil secretion reservoirs.

10. *Castanea.*—Crystals 15 μ; wavy epidermis; sklerenchyma; some pollen grains; presence of few or no non-secreting hairs distinguish it from *Castanea pumila.*

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[2] If there are any doubts about the presence of starch, the reaction for which is sometimes hid by the presence of resinous or other principles, a small quantity of the powder may be boiled for a minute with a few drachms of water in a test-tube, the liquid filtered and tested with iodine and potassium iodide solution.

Regarding the presence of reserve starch and calcium oxalate crystals in plants, the amount of these constituents is an uncertain one owing to the changes induced by certain Fungi. J. H. Wakker, in *Pringsheim's Jahr. f. Wissensch. Bot.*, xxiv, p. 499, states that he found in Rhamnus frangula the calcium oxalate crystals to be fewer and the starch grains more numerous when plants were diseased. See also *Hartig's Lehrbuch der Baumkrankheiten* and Byron D. Halsted's paper before the A. A. A. S., 1898.

11. *Cannabis Indica.*—Crystals 20 μ; characteristic crystolith (200 μ long) with or without broad base (containing $CaCo_3$ in granular masses) attached; oil secretion hairs; characteristic cells of pericarp.

12. *Chimaphila.*—Crystals 55 μ; tannin masses; chimaphilin, red with H_2SO_4.

13. *Conium.*—Crystals 2 μ in aleuron grains about 5 μ; no oil secretion reservoirs of Umbelliferæ; characteristic outer epidermis of seed coat and pericarp; odor alone or when rubbed with KOH.

14. *Eriodictyon.*—Crystals 20–25 μ; long 1-celled, non-secreting hairs; also secreting hairs.

15. *Eucalyptus.*—Three kinds of crystals, rosette shaped, 15 μ diameter, tetragonal 4 x 14 and 25 x 15 μ; thick, greenish cuticle; oil secretion reservoirs and characteristic sklerenchyma.

16. *Fœniculum.*—Crystals 2 μ in aleuron grains about 6 μ; oil secretion reservoirs with characteristic inner epidermis of pericarp running at right angles to length of the former; peculiar thickened latticed parenchyma.

17. *Gaultheria.*—Crystals 20 μ, look as though made up of little plates; stomata numerous with 2 "Nebenzellen;" tufts of fan-shaped crystals (28 μ); stone cells with reddish coloring matter; in chloral glycerin some tissue colored purplish; with Fe_2Cl_6 tannin and oil colored dark purple.

18. *Hedeoma.*—See No. 57. In glycerin mounts have sphere-shaped crystals separating.

19. *Insect Powder.*—Pyrethrum roseum, or Persian—numerous rounded and prickly pollen grains, 25 μ; some few crystals (2 x 8 μ), in stone or in parenchyma adjoining; sklerenchyma fibres being 17 x 105 μ, and 20 x 160 μ, in Dalmatian; fragments of T-non secreting hairs less numerous than in Dalmatian; characteristic, isolated, somewhat rounded or elliptical parenchyma cells (75 x 95 μ), also occurring in papillæ-like fragments. Fragments of papillæ (epidermis of corolla), acute and more numerous than in Dalmatian. In latter rounded and scarcely perceptible; secretion hairs 50 μ, being smaller than in Dalmatian; rose colored fragments in chloral mounts possibly more numerous in the Persian powder.

20. *Pilocarpus.*—Crystals 17 μ; few non-secreting hairs; long sklerenchyma fibres; oil secretion reservoirs; few palisade cells.

21. *Senna.*—Possesses four kinds of crystals—rosette, cubical, te-

tragonal and coffin-shaped, of which the rosette occurs least, and the other three in greatest amount; 1-celled hairs more numerous in Alexandria than in India senna. Boil a small quantity with water, filter and to the light lemon-colored filtrate add KOH and solution becomes red, due to chrysophanic acid reaction.

22. *Stramonii Folia.*—Crystals 10–15 μ, occurring in a characteristic line through the middle of the leaf just below the palisade cells; some secreting and non-secreting hairs.

b. CRYSTALS CUBICAL, RHOMBOHEDRAL, PRISMATIC, TETRAGONAL OR COFFIN-SHAPED.

a Containing Starch:

23. *Cardamom.*—Crystals very small; starch in single small grains, and in masses; fragments of thick, dark sklerenchyma cells being the outer and particularly inner epidermis of seed coat. The Malabar is distinguished from the Ceylon in that the latter has a few 1-celled hairs, the starch grains and crystals are larger and sklerenchyma cells are more prominent.

When the pericarp or fruit wall is present, this is determined by its large parenchyma cells containing brown masses; also sklerenchyma fibres.

24. *Calumba.*—In the stone cells are cubical crystals 15 μ; starch grains characteristic, 35 x 25 μ.

25. *Gelsemium.*—Crystals of three kinds; diamond-shape, 15 x 15 μ, tetragonal, 15 x 20 μ or twin, large prismatic as in quillaja, 8 x 28 μ; starch, 8 x 8 μ; numerous sklerenchyma fibres. In overground stem find remains of chloroplastids in collenchyma; root distinguished from stem by absence of fragments of altered sieve (*i.e.*, internal phlœm).

26. *Guaiaci Resina.*—See note No. 94.

27. *Pulv. Glycyrrhizæ Co.*—Cubical crystals 3 x 2 μ in crystal fibres in fragments of about 117 μ in length; starch about 5 μ in diameter; characteristic crystals and hairs of senna (see No. 21). The powder made from Russian licorice contains few or no fragments of cork.

28. *Spigelia.*—See No. 7.

29. *Xanthoxylum.*—Crystals 7 x 10 μ; starch 10 μ; oil secretion reservoirs; in chloral mount numerous oil globules; sklerenchyma cells and fibres in *X. fraxineum.*

β. Without Starch:

30. *Coca.*—Crystals cubical 3 x 3 μ, coffin-shaped, 3 x 10 μ; peculiarity of epidermis; absence of hairs; *odor.*

31. *Eucalyptus.*—See No. 15.

32. *Gaultheria.*—See No. 17.

33. *Hamamelis.*—Crystals 7–10 μ; 1-celled non-secreting hairs; tannin and resin masses.

34. *Hyoscyamus.*—Crystals of two kinds—rosette-shaped and more or less cubical (10 x 10 μ), the latter chiefly. Numerous secreting and non-secreting hairs.

35. *Senna.*—See No. 21.

36. *Stramonii Folia.*—See No. 22. The rosette-shaped crystals are generally in greater abundance.

37. *Uva Ursi.*—Prismatic and coffin-shaped crystals (7 x 10 μ), in crystal fibres; tannin masses; characteristic sklerenchyma fibres; no oil-cells or reservoirs.

c. CRYSTALS ACICULAR (RAPHIDES).

38. *Cypripedium.*—Crystals 35–58 μ long; starch 2–4 μ; root hairs; oil and resin cells; characteristic odor.

39. *Helonias.*—Characteristic small acicular crystals (35 μ long) in small groups; starch.

40. *Sarsaparilla.*—Crystals 68 μ long; starch 10–20 μ; sklerenchyma fibres. In Mexican sarsaparilla find a pronounced yellowish hypodermis and endodermis, the walls of which are unequal in thickness. In Honduras the latter is not so pronounced. Starch in both rather characteristic.

Needle-shaped crystals other than calcium oxalate are sometimes found in the following:

41. *Buchu.*—See No. 9.

42. *Coca.*—See No. 30.

43. *Chelidonium.*—See No. 52.

44. *Gaultheria.*—See No. 17.

45. *Lobelia.*—See No. 61.

d. CRYSTALS AS FINE SAND-LIKE PARTICLES IN PARTICULAR CELLS. LIKELY TO FIND ALSO ACICULAR CRYSTALS.

46. *Belladonnæ Folia.*—Characteristic grayish or dark-colored cells containing small angular crystals of calcium oxalate; few secreting and non-secreting hairs.

47. *Dulcamara.*—Crystal-sand; starch, 5–7 μ; acicular crystals in parenchyma of bark; ducts with bordered pores; ducts 35–45 μ in width, and accompanied with sklerenchyma fibres; occasional single bast fibre; cork.

B. CALCIUM OXALATE CRYSTALS FEW OR WANTING.

a. Simple hairs present:

48. *Absinthium.*—T-non-secreting hairs; secreting hairs.

49. *Belladonnæ Folia.*—Might be considered here as crystal-sand could be overlooked. See No. 46.

50. *Buchu.*—See No. 89.

51. *Castanea.*—See No. 10.

52. *Chelidonium.*—Non-secreting hairs; milk vessels contain reddish masses; epidermis with papillæ and cells with sinuate margins on surface view; acicular crystals sometimes observed in glycerin mounts.

53. *Digitalis.*—Characteristic non-secreting and secreting hairs; stomata each with 4–5 nebenzellen.

54. *Eriodictyon.*—See No. 14.

55. *Eupatorium.* — Non-secreting and secreting hairs; pollen grains 15 μ; characteristic style.

56. *Galla.*—See No. 14.

57. *Hamamelis.*—See No. 33.

58. *Hedeoma.*—Non-secreting hairs, 2-3-celled; peculiar thickened or reticulated cells of anther; in glycerin mounts, crystals of carbohydrate in "Athemhöhle."

59. *Insect Powder.*—See No. 19. Crystals may not be observed.

60. *Hyoscyamus.*—See No. 34.

61. *Lobelia.*—Non-secreting hairs; sklerenchyma; pollen grains 30 x 15 μ; reticulated seed coat. Leaves distinguished from herb in that in the former fewer pollen grains and seeds are present.

62. *Matico.*—Non-secreting hairs of two kinds, few short, but numerous long and peculiarly jointed; oil secretion reservoirs, numerous in tissues of fruit; spiral ducts; pollen grains nearly cubical; much sand in among the fruit fragments.

63. *Marrubium.*—1–4-celled, non-secreting hairs, either single or in groups; large oil-secreting hairs.

64. *Mentha Piperita* and 65. *Mentha Viridis.*—In chloral mount violet-colored fragments of petals; pollen grains; jointed non-secreting and secreting hairs. In Men-

tha piperita sometimes find in the secretion hairs crystals of Menthol. Non-secreting hairs peculiar and apparently more abundant in Mentha viridis than in M. piperita; taste test characteristic for each.

66. *Nux Vomica.*—Non-secreting hairs give the characteristic reaction for lignin; endosperm, with thick walls, contains oil and protein; blue with $H_2SO_4 + K_2Cr_2O_7$.

67. *Pulsatilla.*—Non-secreting hairs, long and 1-celled; sklerenchyma (mechanical cells).

68. *Salvia*—Non-secreting hairs; 1–4-celled and jointed; also two kinds of non-secretion hairs; stomata, each with two "Nebenzellen."

69. *Scoparius.*—Non-secreting hairs; pollen grains are cubical and may be mistaken for crystals; sklerenchyma with brown contents in lumen.

70. *Scutellaria.*—Non-secreting hairs long, jointed (5 cells); two kinds of secretion hairs; sklerenchyma characteristic and prominent.

71. *Senna.*—See No. 21.

72. *Stramonii Folia.*—See No. 22.

73. *Strophanthus.*—Long secretion hairs, in diameter 10–15 μ; starch grains, 4 μ; parenchyma containing oil, aleuron and starch; narrow, almost colorless collapsed cells; Strophanthin reaction.

74. *Tanacetum.*—Characteristic, bent, non-secreting hairs, made up of 4–5 cells; pollen grains 15 μ; odor characteristic.

(*b*) CONTAINING SECRETION HAIRS OR RESERVOIRS; AROMATIC AND OF CHARACTERISTIC ODOR.

a. With oil-secreting hairs.

75. *Absinthium.*—See No. 48.

76. *Arnicæ Flores.*—Characteristic 5–6-celled, jointed, non-secreting hairs of corolla; also double hairs on outside of ovary; pappus; pollen grains; sklerenchyma.

77. *Belladonnæ Folia.*—See No. 46.

77*a.* *Digitalis.*—See No. 53.

78. *Eriodictyon.*—See No. 14.

79. *Eupatorium.*—See No. 55.

80. *Grindelia.*—Pollen grains, 20 μ; large number of palisade cells; sklerenchyma cells and fibres.

81. Hedeoma.—See No. 58.

82. Mentha Piperita and 83. Mentha Viridis.—See Nos. 64 and 65.

84. Pulsatilla.—See No. 67.

85. Salvia.—See No. 68.

86. Scoparius.—See No. 69.

87. Scutellaria. See No. 70.

β. Containing secretion reservoirs:

88. *Angelica.*—Starch; size of parenchyma cells containing starch characteristic; sklerenchyma; odor.

89. *Arnicæ Radix.*—Inulin masses or crystals soluble in hot water; sklerenchyma fibres; resinous masses.

90. *Caulophyllum.*—Parenchyma cells containing starch characteristic; sklerenchyma; odor.

91. *Cimicifuga.*—Reserve starch; sklerenchyma fibres; ducts.

92. *Eucalyptus.*—See No. 15.

93. *Gaultheria.*—See No. 17.

94. *Guaiaci Resina.*—Numerous lemon-yellow or dark brown resin masses, which on mounting in chloral have a wine-colored halo around them; few fragments of tissues, with characteristic sklerenchyma cells and fibres; few crystals of calcium oxalate (cubical or coffin-shaped) in parenchyma.

95. *Kava Kava.*—Starch; yellowish resin and oil; sklerenchyma more of nature of that found in fruits and seeds.

96. *Leptandra.* Starch characteristic; brown stone cells.

97. *Matico.*—See No. 62.

98. *Pilocarpus.*—See No. 20.

99. Piper Album and 100. Piper Nigrum.—Starch and oil in perisperm; stone cells. Piper album has fewer stone cells than Piper nigrum.

101. *Sabina.*—Starch, 4 μ; characteristic hypodermis, consisting of long fibres (15 μ wide), associated with epidermis.

102. *Sumbul.*—Starch; sklerenchyma fibres numerous.

103. Tanacetum.—See No. 74.

C. SKLERENCHYMA CELLS (STONE CELLS) OR FIBRES (WOOD OR BAST).[1]

104. *Aletris.*—Starch; yellowish or reddish-yellow colored sklerenchyma.

105. *Arnicæ Radix.*—See No. 89, sklerenchyma fibres.

106. *Calumba.*—See No. 24, stone cells.

107. *Cimicifuga.*—Starch; resin cells; sklerenchyma fibres; ducts.

108. *Chenopodium.*—Characteristic reddish-brown pericarp and seed coat; numerous starch grains, in size up to 10 μ; fine granular contents = aleuron.

109. *Chirata.*—No starch; few small pollen grains, 4 x 10 to 7 x 10 μ; parenchyma large, with simple pores; many sklerenchyma fibres, in width 20 μ, walls 4 μ thick; scalariform ducts, 30 μ in width, also isolated spiral ducts; yellow epidermis, with some collenchymatic parenchyma, latter with brown contents; with the latter are associated mycelial-like development, containing blackish-brown colored substance; few seeds in shape like Hyoscyamus, and reticulated like Lobelia, but cells larger and walls 4 μ thick.

110. *Cydonium.*—Without starch or calcium oxalate crystals; outer clear mucilage cells as in Linum; beneath the latter are thick-walled cells, containing brown contents, which react like tannin; parenchyma containing oil and aleuron.

111. *Grindelia.*—See No. 80, stone cells and fibres.

112. *Guaiaci Resina.*—See No. 94, very few stone cells and fibres.

113. *Lappa.*—Numerous irregular transparent fragments or sphere crystals (more or less fan-shaped) soluble in hot water = Inulin; no secretion reservoirs; more wood fibres and possibly larger reticulated ducts (as much as 70 μ wide) than Inula; cells of periderm brownish becoming yellow.

114. *Leptandra.*—Starch characteristic; brown stone cells.

115. Piper Album and 116. Piper Nigrum. } See Nos. 99 and 100, stone cells.

117. *Physostigma.*—Starch, 25 x 40 μ; oil and protein in irregular granular masses; characteristic sklerenchyma and stone cells whose contents are reddened by alkalies.

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[1] If thought necessary, can isolate characteristic stone cells and sklerenchyma fibres by treatment of powder with Schulze's macerating fluid or sulphuric acid.

118. *Podophyllum.*—Crystals sometimes appear wanting; starch grains single (5–8 μ) or in groups of 4 to 6 grains; numerous single cells or groups with yellowish resinous contents; ducts and sklerenchyma fibres.

119. *Sarsaparilla* (*Honduras*) and 120. *Sarsaparilla* (*Mexican.*) } See No. 40.

121. *Senega.*—Parenchyma and sklerenchyma fibres characteristic; mounts in chloral show some pinkish (or strawberry-colored) cells.

122. *Scoparius.*—See No. 69.

123. *Scutellaria.*—See No. 70.

124. *Spigelia.*—Rosette crystals, 10–15 μ; tetragonal crystals, 3–10 μ; sklerenchyma fibres; parenchyma containing pink-colored contents; starch, 4 μ; peculiar hypodermis; may contain $CaCO_3$.

125. *Sumbul.*—Starch; resin secretion reservoirs; numerous sklerenchyma fibres.

(D) SEEDS WITH THEIR CHARACTERISTIC SEED COATS.

126. *Chenopodium.*—See No. 108..

127. *Lobelia.*—See No. 61.

(E) RESERVE STARCH.

128. *Aletris.*—See No. 104, sklerenchyma.

129. *Angelica.*—See No. 88, parenchyma, odor.

130. *Aralia nudicaulis.*—See No. 2, crystals.

131. *Aralia spinosa.*—See No. 3, crystals.

132. *Caulophyllum.*—See No. 90, parenchyma, odor.

133. *Chenopodium.*—See No. 108, stone cells.

134. *Cimicifuga.*—See No. 91, fibres.

135. *Cypripedium.*—See No. 38, crystals, resin.

136. *Helonias.*—See No. 39, crystals.

137. *Kava Kava.*—See No. 95, sklerenchyma.

138. *Leptandra.*—See No. 114, stone cells.

139. *Physostigma.*—See No. 119, sklerenchyma cells and fibres.

140. *Piper Album* and 141. *Piper Nigrum.* } See Nos. 115 and 116, stone cells.

142. *Sarsaparilla* (*Honduras*) and 143. *Sarsaparilla* (*Mexican*). } See No. 40, sklerenchyma.

144. *Spigelia.*—See No. 124, parenchyma.

145. *Serpentaria.*—Starch, 10 μ, grains as a whole apparently larger than in spigelia; sklerenchyma fibres and ducts; many parenchyma cells contain a yellowish or reddish-brown substance, as also the cork cells.

146. *Sumbul.*—See No. 125, sklerenchyma fibres.

147. *Xanthoxylum.*—See No. 29.

(F) CONTAINING POLLEN GRAINS.

148. *Castanea.*—See No. 10, crystals.

149. *Chelidonium.*—See No. 52, milk vessels.

150. *Eupatorium.*—See No. 55, hairs.

151. *Grindelia.*—See No. 80, hairs and sklerenchyma.

152. *Hedeoma.*—See No. 58, hairs, stomata.

153. *Insect Powder.*—See No. 19, hairs and sklerenchyma.

154. *Lobelia.*—See No. 61.

155. *Marrubium.*—See No. 63, hairs.

156. *Mentha Piperita*, and 157. *Mentha Viridis.* } See Nos. 64 and 65, hairs.

158. *Passion Flowers.*—See No. 5, pollen.

159. *Pulsatilla.*—See No. 67, hairs.

160. *Scoparius.*—See No. 69, hairs.

161. *Scutellaria.*—See No. 70, hairs.

162. *Tanacetum.*—See No. 74, hairs.

G. INULIN MASSES OR CRYSTALS (SOLUBLE IN HOT WATER).

163.—*Arnicæ Radix.*—See No. 89, sklerenchyma and resin masses.

164. *Lappa.*—See No. 113, ducts and wood fibres.

165. *Taraxacum.*—Numerous crystal-like groups, or sphere-crystals, giving in glycerin mounts the parenchyma a characteristic appearance; yellowish-brown milk vessels 10 μ in width; reticulated ducts are 45 μ wide, and associated with them are characteristic non-lignified "Ersatzfasern."

H. CONTAINING TANNIN MASSES.

166. *Chimaphila.*—See No. 12, crystals.

167. *Galla.*—See No. 4, crystals and starch.

168. *Gaultheria.*—See No. 17, crystals.

169. *Hamamelis.*—See No. 33, crystals and hairs.

170. *Uva Ursi.*—See No. 37, crystals.

GROUP NO. 2. COLOR WHITISH.

Wheat flour, Corn starch, Wheat starch, Potato starch, Rice starch, Bermuda arrow root starch, Montserrat arrow root starch, Wheat middlings, Corn meal, Corn bran, Orris root, Resina jalapæ, Dextrin (white), Gum arabic (white), Tragacanth, Saccharum (cane), Sacch. Lactis, Scilla, Camphora, Talc, Prepared chalk, Ppt. chalk, Pulv. Cretæ Comp., $BaCO_3$, $BaSO_4$, $CaSO_4$, Heavy magnesia (MgO), Light magnesia (MgO), Antimony oxide, Antimonial powder, Tartar emetic, Calcium phosphate ppt. [Ca_3 $(PO_4)_2$], Terra alba, Potassium bitartrate.

I. PLANT TISSUES OR CELL CONTENTS RECOGNIZABLE.

A. CONTAINING STARCH.

a. *Unaltered starch alone.*—Grains characteristic for each; completely soluble in glycerin on heating, and precipitated on the addition of water.

171. *Arrow root starch* (Bermuda).

172. *Arrow root starch* (Montserrat).

173. *Corn starch.*

174. *Rice starch.*

175. *Wheat starch.*—Does not agglutinate on mixing with water distinction from wheat flour.

b. *Altered and unaltered starch grains.*

176. *Dextrin.*—Sticky mass with water; unaltered starch grains detected.

c. *Plant tissues in addition to starch grains.*—The former remain upon treatment with hot glycerin.

a. Do not readily dissolve or swell in cold water and become transparent and sticky.

177. *Corn meal.*—More starch and oil and little hull.

178. *Corn Bran.*—Less starch and oil and more hull.

179. *Wheat Flour.*—Agglutinates with water, distinction from wheat starch; little tissue of wheat grain.

180. *Middlings of Wheat.*—Starch and numerous fragments of tissues of wheat.

181. *Orris Root.*—Characteristic starch grains 15 x 15 to 15 x 30 μ; scalariform ducts 25 μ wide; no cork.

B. SOLUBLE OR SWELL IN COLD WATER TO FORM A STICKY MASS.

182. *Acacia* (white).—Soon affected by water; few plant tissues.

183. *Tragacanth.*—Slowly affected by water; fragments of ducts and parenchyma; more likely to find corn starch grains in commercial powder.

B. WITHOUT STARCH.

184. (*a*) *Acicular crystals.*

Squills.—Also find isolated fragments of fibro-vascular tissue.

II. ABSENCE OF PLANT TISSUES.

A. SOLUBLE IN WATER.

185. *Cane Sugar.*—Characteristic crystals; soluble also in mounts of glycerin and glycerin + chloral; taste.

186. *Potassii Bitartras.*—Soluble in water with acid reaction; with sodium cobaltic nitrite solution get small yellow cubical crystals, which are permanent in glycerin mount.

187. *Tartar Emetic.*—Large irregular masses; add HCl to the powder on a slide, and then pass H_2S over the same, get an orange-red precipitate, which is permanent in a glycerin mount.

B. INSOLUBLE IN WATER.

(*a*) Soluble in alcohol.

188. *Camphor.*—Liquefies in mounts of glycerin and chloral; glycerin mounts show irregular masses.

189. *Resina Jalapæ.*—In glycerin get irregular opaque fragments, which swell and by and by look like huge amœboid masses; in glycerin and chloral the fragments become rounded, transparent and finally dissolve.

(*b*) Insoluble in alcohol.

α. With H_2SO_4 *reddish color after some time.*

190. *Saccharum Lactis.*—Small and large irregular-shaped crystals, insoluble in mounts of glycerin or glycerin + chloral.

β. No color reaction with H_2SO_4.

* *Soapy feel.*

191. *Talc (or Magnesium Silicates).*—Rather lustrous long irregular crystals.

** *Effected by acetic acid.*

† *With effervescence.*

192. *Calcii Carbonas Præcipitatus* ($CaCO_3$).—Add hot solution of ammonium oxalate to acetic acid solution on slide, get crystals of calcium oxalate. Mount in glycerin and observe rosette or cubical crystals of a rather uniform size.

193. *Creta Præparata* ($CaCO_3$).—Same treatment as above, but CaC_2O_4 crystals are triangular and cubical and not of uniform shape.

194. *Pulvis Cretæ Compositus.*—On addition of acetic acid notice peculiar gummy mass containing crystals of sugar, which are soluble in water.

195. *Barium Carbonate* ($BaCO_3$).—Add H_2SO_4, and in glycerin mount the $BaSO_4$ precipitate is bacteria-like; flame test, green.

†† *Soluble in acetic acid without effervescence.*

196. *Heavy Magnesia* (MgO).—Alone in glycerin mount observe small rounded masses frequently grouped together; if dissolve, a few milligrammes on a slide or watch crystal in citric acid, then add a few drops (excess) of ammonium hydrate and Na_2HPO_4 and stir vigorously with a glass rod, triangular or tetragonal crystals are formed in glycerin mount.

197. *Light Magnesia* (MgO).—In glycerin mount looks like heavy magnesia, but masses are larger and more transparent. On treatment with citric acid, NH_4OH and Na_2HPO_4, the crystals of $MgNH_4PO_4$ in glycerin mount are large star-shaped, and look like snow crystals.

*** *Unaffected by acetic acid.*

† *Soluble in Nitric Acid.*—If necessary, in deciding on any of the next four, they are to be fused with K_2CO_3 or Na_2CO_3, and a regular qualitative chemical separation effected.

198. *Calcii Phosphas Præcipitatus* [$Ca_3(PO_4)_2$].—In glycerin mount alone get small tetragonal and cubical crystals. If to a few milligrammes of the powder on a slide, we add a few drops of HNO_3, and then ammonium molybdate solution, stirring well with a glass rod, get small yellow diamond-shaped crystals, permanent in glycerin mounts.

199. *Calcii Sulphas.*—In glycerin mount alone observe needle-

shaped crystals or long crystals in masses (looks like group of sklerenchyma fibres); flame test on platinum wire = bright reddish-yellow.

200. *Barium Sulphate.*—In glycerin mount alone observe irregular-shaped crystals varying from small to large; flame test = green.

201. *Terra alba.*—This is aluminum silicate (3 : 5) and magnesia.

†† *Insoluble in nitric acid.*

202. *Antimony Oxide.*—In glycerin mount alone get irregular, transparent, small to large fragments; add drop of HCl to powder on the slide, then pass H_2S over the solution, get orange-red precipitate.

203. *Antimonial Powder.*—Small tetragonal and cubical as well as irregular transparent crystals. Add HCl, then H_2S = orange-red precipitate.

(*To be continued.*)

GLEANINGS FROM THE MEDICAL JOURNALS.

By Clement B. Lowe, M.D.

GLASS MILK JARS.

The employment of individual glass jars for the retention of milk delivered by peddlers has been prohibited by milk inspectors in several cities, on the ground that they are dangerous to public health. The objection is advanced that their sterilization is impossible, as water of the requisite temperature to destroy germs would break the jars. Safety is only insured by the use of receptacles that can be subjected to steam heat. The glass jar has been tabooed at the West Point Military Academy, and should be generally abolished, and especially its pasteboard coverlid.—*Phila. Med. Jour.*, August 13.

REPEATING PRESCRIPTIONS.

Repeating prescriptions cause much trouble in many sections of the country. In India few doctors hand the prescription to the patient. The document is sent directly to the druggist, who never thinks of refilling it for a customer unless so ordered by the prescriber.—*Phila. Med. Jour.*, August 13.

TO REMOVE A FOREIGN BODY FROM UNDER THE NAIL.

Alternately soften the nail with the end of a match dipped in caustic potash, and scrape with a piece of glass until the object is reached.—*Journal de Med. de Paris*, July 3.

SALT AS AN ANTISEPTIC.

According to the *Cronica de Ciencias Medicas de Filipinas*, the insurgents dress wounds with dry salt or strong brine, from lack of usual antiseptics, and wounds from fire-arms heal under it in four or five days.—*Jour. Amer. Med. Assoc.*, August 20.

MODERN BULLET WOUNDS.

"The destructive character of the bullets when they strike a hard surface, was shown in the wounds treated during the recent riots in Milan, states the *Klin. Therap. Wochenschrift*, of June 26th. Every arm or limb wounded had to be amputated; every person shot in the trunk died, and whenever the skull was struck, the top was lifted up like the cover of a box, and the brain matter scattered around." —*Jour. Amer. Med. Assoc.*, August 20.

THE PARIS SEWAGE PARK.

The luxuriance of the vegetation on these fields is remarkable; all kinds of vegetables and medicinal plants thrive to perfection, irrigated with water from the Paris sewers, which is so purified in its course that it emerges from the "park" limpid and pure, as visitors taste and exclaim. There is no perceptible odor except in the midst of a network of irrigating canals, and a few steps beyond it is impossible to distinguish it. All fear of contaminating the atmosphere of the vicinity has proved groundless. The number of bacteria is reduced to approximate spring water, and the authorities claim that the infection of the Seine will diminish with increased areas appropriated for sewage parks, until it will cease altogether, when all the sewer water from the city is spread out thus on the fields. The amount thus ultilized is 20,653 cubic metres to the hectare; there are 795 hectares (1,964 acres) devoted to the purpose.—*Jour. Amer. Med. Assoc.*, August 27.

SPEECH DEFECTS.

Scheppegrell (*New Orleans Med. and Surg. Jour.* for August) writes on the etiology and treatment of stuttering, stammering, etc., and groups the forms of speech defects in two classes: paralalia and dyslalia, the former referring to defective speech, lisping, etc., and the latter to difficult or spasmodic speech, as stammering and stuttering. He considers prophylaxis of the utmost importance,

and believes the inclination of mothers to teach their children baby-talk cannot be too severely condemned, as they become so accustomed to this method of speech as to make it difficult to change it. He points out that girls suffer less from the more severe forms of speech defects than boys, and some authors have even doubted the existence of female stutterers, while Coen of Vienna, places the number at only 1·5 per cent. of the whole number affected. He says that children should not be allowed to associate with stammerers, as the children may not only be influenced, but there is also a tendency to aggravate the defect in the case of the stammerer.

THE CONGENITALLY BLIND AS OUTLOOK MEN AT SEA.

The *Dublin Journal of Medical Science* for August quotes the *Lyon Medical* for July 17th as stating that the frightful catastrophe of the sinking of the steamship "Bourgogne" recalls a lecture delivered some years ago by Dr. Dufour, of Lausanne. This celebrated oculist, interested in the means of securing a livelihood for the unfortunate blind, passed in review all the callings which might make use of the extraordinary power of hearing with which these persons are endowed. Among others, he declares that all swift vessels should have on board two men born blind to serve as outlook men in foggy weather. Dr. Dufour asserts, as a result of experiments made on the Lake of Geneva, that the acuteness of hearing in these persons is such that they can easily recognize at a great distance the noise of a moving vessel, and, *a fortiori*, the acoustic signals which it may make with the object of furnishing exact information as to its position and course.

The suggestion is a valuable and a practical one.—*N. Y. Med. Jour.*, August 20.

RECENT LITERATURE RELATING TO PHARMACY.

DETERMINATION OF MANGANESE IN PLANTS.

P. Richard gives a colorimetric method (*Compt. rend.*, 1898, p. 550) for the rapid determination of manganese in plants and humous soils. The plant or soil is incinerated, fused with sodium or potassium carbonate, a little nitric acid is added, and then placed in a test-tube with a little minium or lead bioxide, water containing some nitric acid added and the solution boiled. The rose color of the solution indicates manganese.

SWEET GUM OIL.

The leaves of *Liquidambar styraciflua L.*, have, when bruised, a peculiar turpentine-like odor. When distilled they yielded only 0·085 per cent. of oil, having a greenish-yellow color, a specific gravity of 0·872, the optical rotation 38° 35′, the saponification number 0·9, and the acetylization number 25·2. The oil contains terpene, borneol and bornyl acetate, and the odor recalls that of the oil of *Abies pectinata*, D. C.—*Schimmel's Report*, 1898, p. 53.

CHINESE INSECT WHITE WAX.

According to G. F. Smithers (U. S. Consular Reports, 1897, p. 484) the best of the insects (*Coccus pe-la*) that produce white wax are found in the Chien-Chang Valley. Those from elsewhere bring a lower price, where they are found on the evergreen, *Ligustrum lucidum*, which has various local names, as ch'ung shu, or insect tree; tung ching shu, or evergreen tree; and pao-kê-ts'ao shu, or crackling flea tree. The insects from Chien-Chang Valley, found for the most part near the town of Tê Chang on the Au-ning River (latitude 27° 24′), are transported to the plain north of the Ta-tu River north of Chien Chang, where they are placed on the wax tree, *Fraxinus chinensis*, known to the Chinese as the pai la shu. One pound of the scales produces 4 to 5 pounds of wax. The process of obtaining the wax is described.

ASSAY OF SYR. IODIDE OF IRON.

Ralph S. Swinton (*Chem. and Drug.*, 1898, p. 837) proposes the following: Dilute 10 c.c. of the syrup with 90 c.c. water; slowly mix 10 c.c. of this solution with 5 c.c. of strong sulphuric acid, keeping the vessel cool by allowing a stream of cold water to flow over it. When nearly cold, thoroughly agitate the mixture with 5 c.c. of phenol (90 per cent.), then with 25 c.c. of a completely saturated bromine water; remove the separated iodine by washing out with chloroform (two washings usually suffice), treat the mixture again with phenol-bromine, separate the iodine as before and mix with the first portion. The whole chloroformic-iodine solution is now covered with a layer of water and titrated with decinormal sodium thiosulphate, with starch paste as an indicator. 1 c.c. decinormal sodium thiosulphate = 0·0155 gm. FeI_2. The whole process occupies only a few minutes and is accurate.

INFLUENCE OF THE ORGANISM ON TOXINS.

E. Metchnikoff concludes (in *Ann. Inst. Pasteur*, xi, p. 801) that plants such as bacteria and fungi can destroy toxins and transform them into vaccines without producing an antitoxin; that the invertebrates are capable of producing a tetanic antitoxin in appreciable quantities; that the production of antitoxins begins in the animal series with the crocodiles, where the power is more highly developed than in the higher animals; that the antitoxic power is not to be considered as bound to any febril reaction whatever; that the antitoxic property of the fowl is in the blood; that it is not possible to accept the idea that natural immunity depends on the antitoxic power, and that the antitoxic property in the animal kingdom has an evolution less ancient than the phagocytic reaction.

THE CARBONYL FIGURE IN ESTIMATION OF RESINS.

M. Kitt (*Chem. Zeit.*, 1898, p. 358) proposes to apply the method of Strache (*Ibid.*, 1891, p. 1207), used by him in the determination of the carbonyl oxygen of aldehydes and ketones, to the analysis of the resins. The resin to be examined is treated with acetate of soda and 20 c.c. of a 5 per cent. alcoholic solution of phenyl hydrazinchlorhydrate, whereby there is formed with the hydrazin salt a hydrazone compound. The excess of hydrazin salt that is taken is obtained by oxidizing the excess with a hot Fehling's solution and measuring the nitrogen given off. A check test with the hydrazin solution alone is made, and the difference between the two gives the amount of nitrogen given off in the reaction. The carbonyl figure, *i. e.*, the per cent. of carbonyl oxygen of the substance is obtained from the formula:

$$\text{Per cent. O} = (V - V_0)\frac{0{\cdot}07178}{S}\,9.$$

The $V - V_0$ is the difference in volume of the nitrogen calculated to 0° and 760 millimetres pressure, and S is the amount of substance taken in grammes.

CONSTITUENTS OF LICORICE.

A. Tschirch has carried out some investigations on glycyrrhiza root (*Schweiz. Woch. f. Chem. u. Pharm.*, 1898, 189), and he finds three substances, viz.: glycyrrhizin, mannit and a sugar, which he did not succeed in crystallizing. He obtained 2·5 per cent. of pure

glycyrrhizin from air-dried Russian licorice root. The researches are to be continued.

TEST FOR COTTON-SEED OIL.

G. Marpurgo (*Schweiz. Woch. f. Chem. u. Pharm.*, 1898, p. 184) has experimented with the new method for detecting cotton-seed oil in oil mixtures, as given by Fortelli Ruggeri (*Selmi*, 1898, p. 1). The method (*Schweiz. Woch. f. Chem. u. Pharm.*, 1898, 194) is as follows: 5 grammes of the oil is mixed with 30 c.c. of a 6 per cent. alcoholic KOH solution and saponified at a comparatively low temperature. It is neutralized with acetic acid, using two drops of a phenolphthalein solution as an indicator. After this, it is saponified with a 10 per cent. neutral lead acetate solution. The soap is washed with lukewarm water, dried on filter paper and treated with 100 c.c. ether in a flask connected with a reflux condenser. It is heated for a few minutes and then allowed to stand for a half hour. The lead salts of the stable fatty acids separate and are removed from the ethereal solution. The latter is treated with HCl in a separating vessel and freed from lead. The ethereal solution is washed with water until all traces of acid are removed and then filtered and distilled. The residue from the distillation is taken up with 10 c.c. of 90 per cent. alcohol and treated in a test-tube with 1 c.c. of a 5 per cent. aqueous silver nitrate solution and heated to 60°–80° C. on a water-bath. If there was no cotton-seed oil present, the solution is clear from one-quarter hour to one hour. If cotton-seed oil is present, the solution becomes dark and blackens and deposits a black precipitate. This reaction is characteristic for admixtures of 1–5 per cent. of cotton-seed oil, and is characteristic for this oil alone.

The author also experimented satisfactorily with the method of Cavalli, using resorcin, given in *Selmi*, 1897, p. 113.

SPIRITUS SAPONATUS.

For the preparation of spirit of soap in the cold, L. Meissen (*Pharm. Zeit.*, 1898, p. 254) proceeds as follows: 10·5 parts of melted KOH are dissolved in 50 parts of alcohol; to this is added 60 parts of olive oil. The saponification occurs in a few hours, with occasional shaking of the mixture. After this, 250 parts of alcohol, and then 230 parts of water are added, and the spirit filtered.—*Chem. Zeit.*, 1898, p. 119.

EDITORIAL.

DEFINITION OF POISONS.

It is more and more evident as the time draws near for the publishing of the next Pharmacopœia, that the Committee on Revision has to consider the introduction of new features which may or may not be desirable. Some say: "Incorporate the National Formulary with the Pharmacopœia!" Others say: "Put in maximum and minimum doses!" And still others now say: "The Pharmacopœia is the authority to define what shall constitute a poison!" Regarding these advocates and their desires, we repeat what was said in the June number of this JOURNAL, that some will object to the coming Pharmacopœia, doubtless, because it is not permeated with sufficient material that is required in everyday practice, and may say that it does not represent the professions of to-day. It must be borne in mind that the research and practice of to-day is always a step in advance of the knowledge that is accepted. There always must be the experimental or "scouting" party in search for new truths, and these are the results that are apt to be upon every tongue, and in every office and shop, and ofttimes uppermost in the minds of those who are engaged in daily practice of the professions. But these things with their reports neither represent truth nor definite knowledge, nor anything that is certain and ought to be made pharmacopœial. This distinction can only be given these reports when this knowledge has been shaped into something definite and certain, and has been repeatedly confirmed by others.

It is not our purpose to say anything with regard to the desirability or undesirability of introducing the National Formulary or doses into the Pharmacopœia, but to consider some of the difficulties involved in a definition for the word "poison," and ask, "Suppose the U.S.P. did give us a perfect definition, of what use would it be?" Unquestionably, those who ought to be consulted in the framing of a definition of poisons are the medical writers and experts on toxicology, medical jurisprudence, and the makers of dictionaries. If we consult these we find, for instance, that:

Beck says: "The ancients considered everything as poisonous that produced malignant symptoms and attacked directly what we style the vital principle. Dr. Mead's definition includes every substance which in small doses can produce great changes in the living body. Foderé considers poisons to be those substances which are known by physicians as capable of altering or destroying, in a majority of cases, some or all of the functions necessary to life." He, however, adopts the definition given by Guy, that "a poison is any substance which, when applied to the body externally, or in any way introduced into the system without acting mechanically, but by its own inherent qualities is capable of destroying life."

Reese defines a poison as "a substance which, when introduced into the body by any method, occasions disease or death; and this as an ordinary result in a state of health, and not by a mechanical action."

Wharton and Stillé say: "Physicians generally understand by the word poison a substance having an inherent deleterious property, which renders it, when taken into the system, capable of destroying life. It is difficult, however, to give a definition to the term which will meet the significance attached to it by different classes of persons, for while in common language, poisons are understood to be those articles only which are deadly—in small doses—as strychnine, prussic acid, arsenic, etc.—the lawyer and the physician will unite in affixing to it a general meaning, similar to which we have given above."

Taylor defines a poison to be (as commonly defined) "a substance which, when administered or taken in small quantity, is capable of acting deleteriously on the body. In proper language, this term is applied only to those substances which destroy life in small doses. This

popular view of the nature of a poison is too restricted for the purposes of medical jurisprudence." * * * * If then a medical witness is asked "What is a poison?" he must beware of adopting this popular view, or of confining the term "poison" to a substance which is capable of operating as such in one small dose. In legal medicine it is difficult to give such a definition of a poison as shall be entirely free from this objection. Perhaps the most comprehensive which can be suggested is this: "A poison is a substance which, when absorbed into the blood, is (by a direct action.—Ed.) capable of seriously affecting health or destroying life." [The definition given by *Dr. Alexander W. Blyth* in his work on poisons is perhaps the best: "A substance of definite chemical composition, whether mineral or organic, may be called a poison, if it is capable of being taken into any living organism, and causes, by its own inherent chemical nature, impairment of function."]

Kobert says: "Der Begriff *Gift* bedeutet im gewöhnlichen bürgerlichen Leben etwas anderes als in den Wissenchaften, ja selbst in diesen nicht immer dasselbe.

"Der Laie kennt nur unbedingte Gifte: Arsenik, Phosphor, Blausäure etc. sind für ihn *Gifte schlechthin*, d. h. er nennt diese Stoffe selbst dann noch Gifte, wenn sie zu Arzneilichen Zwecken gebraucht werden und handgreiflichen Nutzen schaffen.

"Die Medicinische Wissenschaft kennt solche *unbedingte* Gifte (venena absoluta) überhauft nicht, sondern nur *relative;* d. h. jedes absobute Gifte des gemeinen Mannes kann im Sinne der Wissenschaft auch als Arznei wirken; umgekehrt können Zahlreiche Stoffe, welche der Laie nicht als Gifte bezeichnet, im Sinne unserer Wissenschaft gelegentlich als Gifte wirken, z. B. selbst das so indifferente Kocksalz. Endlich brauchen nach der Lehren der modernen Medicin die Gifte gar nicht von aussen eingeführt werden, sondern können im Körper entstehen.

"Die Juristische Wissenschaft steht noch anders: bei ihr kann von Vergiftung nur geredet werden, wenn wirklich eine Substanz *gegeben* oder *genommen* worden ist; im organismus des Menschen entstandene Gifte, mögen sie auch noch so fruchtbar wirken, ja mögen sie selbst mit bekannten anderen Gitten identisch sein (Muscarin), sind also nach den Anschauungen unserer Juristen keine Gifte. Weiter muss die betreffende Giftsubstanz juristischer Definition gemäss gegeben oder genommen sein, *um die Gesundheit zu schädigen*; d. h. eine nach medicinischer Anschauung selbst noch so giftige Substanz wird erst dann für den Juristen zum Gift, wenn dem Verbrecher *bekannt ist, dass sie die menschliche Gesundheit zur zerstören geeignet ist.* Es kommot also der Jurisprudenz auf den *Dolus* an. Wer daher z: B. Jemanden Arsenik giebt, um ihn blühend aussehen zu machen, ihn aber dadurch tödtet, hat im Sinne des Gesetzes keinen Giftword, sondern eine *fahrlässige Tödtung* begangen."

Kobert then adopts with some reserve this definition for poisons in his medical Toxicology. "Gifte sind solche, theils unorganische, theils organische, im organismus entstehende oder von aussen eingeführte, theils künstlich dargestellte, theils der Natur vorgebildete, nicht organisirte Stoffe, welche durch ihre chemische Natur unter gewissen Bedingungen irgend welches Organ lebender Wesen so beeinträchtigen, dass die Gesundheit oder das relative Wohlbefinden dieser Wesen dadurch vorübergehend oder dauernd schwer beeinträchigt wird."

From a *pharmacological standpoint* Kobert brings his definition into the following kernel: "Gifte sind alle pharmacologischen Agentien, wenn sie in einen gegebenen Falle nicht nützlich sondern schädlich wirken."

He then sums up the matter and says: "Aus dieser Zusammenstellung geht hervor, dass in *keine Lande das Gesetz im Stande ist den Begriff Gift scharf zu definiren.* Nichts destoweniger lässt sich fast in allen Fällen medicinisch vor Gericht genau angeben, ob in einem bestimmten Falle eine Vergiftung vorliegt oder nicht. Der im Staatsdienst stehende Mediciner muss sich eben gewöhnen, vor *Gericht juristisch zu denken.* Wenn er den Fall dann später für ein medicinisches Blatt zur Publikation Zurecht macht, so kann er auch der wissenschaftlichen Medicin volle Gerechtigkeit wiederfahren lassen, ohne dass er fürchten muss, mit sich selbst in Widerspruch zu kommen."

Ed. R. von Hofmann says: "Unter Giften versteht man Substanzen, welche schon in verhältnissmässig kleiner Menge in den Organismus gebracht, auf andere als mechanische oder thermische Weise die Gesundheit zu schädigen oder den Tod herbeizuführen vermögen. Diese Begriffsbestimmung lässt zwar von streng toxicologischen Standpunkte manchen Einwand zu, entspricht jedoch dem allgemeinen sprach gebrauche und dürfte umsomehr genügen, als es bis jetzt nicht gelungen ist, den Begriff 'Gift' vollkommen genau zu definiren."

Herman says: "Gift nennt man diejenigen Substanzen, welche in thierische Organismen eingeführt in denselben functionelle Veränderungen herbeiführen. Zuweilen fasst man die

Definition enger, in dem man nur dann eine Substanz Gift nennt, wenn sie schon in kleiner Menge wirksam ist und wenn die von ihr hervorgebrachte Veränderung den Bestand des Organismus gefährdet. Da jedoch diese Einschrankungen nicht streng begrenzt sind, so sind sie entbehrlich, zumal da, wie sogleich gezeicht werden wird, der Umfang des toxicologischen Materials sich durch andere Rücksichten bestimmt, als durch die Definition des Wortes 'Gift,' welche nur in juristicher Hinsicht bedeutsam ist."

Dunglison says the term poison is a "generic name for all substances which, when introduced into the animal economy, either by cutaneous absorption, respiration, or the digestive canal, acts in a noxious manner on the vital properties or texture of an organ. Hence we speak of *fever poison*, *cholera poison*, etc. Poisons exist in the three kingdoms of nature; poisons from animals are called *venoms*, as the venom of the viper, etc., whilst those that are the product of disease have the name *virus*. In common parlance, therefore, the word poison is restricted to deleterious articles furnished by the mineral and vegetable kingdoms."

Thomas uses the term poison to include "an animal, vegetable or mineral substance, which, when applied externally, or taken into the stomach, or the circulatory system operates such a change in the animal economy as to produce disease or death." A similar definition is given in Lippincott's Medical Dictionary.

Gould defines a poison as "a substance that destroys the life of an organism or impairs the functions of one or more organs."

It is apparent from these numerous citations of medical authorities that we have in the term poison an indefinite something. Wharton and Stillé, Herman and Kobert give us the basis for an ideal definition. We find that the term poison may be applied to those substances which, when introduced into the animal organism, cause functional disturbances. It matters not how introduced, or what the action, or what the origin, dose or even the motive may be. Von Hofmann and Kobert, however, warn us further that it has not been possible as yet to exactly or successfully define the word poison in any land.

We admit the desirability of having a definition for poisons which shall protect all mankind to the fullest extent, but there are so many factors which influence this subject, and not the least those of disease and the peculiarities of the individual, that it must be apparent that it is by no means a promising task for the Committee on the Revision of the Pharmacopœia to undertake at present. A book of the size of the Pharmacopœia itself might be written and the task not completed.

This subject ought to be carefully considered as it really is the point of departure in considering the question of the introduction of dosage in the U.S.P. To sum up we would say that an ideal definition for the word poison would leave the subject just as we understand it to-day, subject to numerous conditions and circumstances, depending upon the intelligence and competency of those having the sale thereof; and any other definition would be impracticable. Therefore, we believe that, for the present, the Pharmacopœia cannot undertake to define what is a poison.

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REVIEWS AND BIBLIOGRAPHICAL NOTICES.

BULLETIN OF THE BOTANICAL DEPARTMENT, JAMAICA. Edited by William Fawcett, Director of the Public Gardens and Plantations. Kingston, Jamaica: Government Printing Office, 79 Duke Street. 1898.

This Bulletin contains information concerning the following subjects: Report on Sugar Cane, Anti-Malarial Tree, Wild Olives of Jamaica, Methods of Propagating Oranges and other Citrus Fruits, Analysis of Cuba Tobacco Soil, Synoptical List of Ferns, Contributions and Additions to the Library, etc.

It has been stated frequently in the Bulletin that the olive (*Olea Europœa*) has not been known to flower or fruit in Jamaica. Nevertheless, numerous communications are received to the effect that the writers have seen the olive tree bearing fruit. In all these cases the examination showed that there are several wild olives, but none of them are the true olive of commerce. Information given to inquiries on this point have more than once saved the investment of capital in an attempt to introduce and grow the olive on a commercial scale in places where a "*Wild Olive*" is known to bear abundant fruit. Some of these "Wild Olives" are *Ximenia Americana*, L. (N. O. Oleaceæ), called Mountain Plum or Seaside Plum. The tree is usually armed with spines, and the leaves are not opposite, as in the olive. The fruit is about the size of an olive, of a yellow color, with a peculiar aromatic flavor and delicious perfume; there is one stone, the kernel of which tastes like a filbert. The fruit is useful in cases of habitual constipation and gastric troubles when the irritating action of drastic purgatives is to be avoided; the kernel being more strongly purgative. *Ximenia* is a native of the tropics, and in India the Brahmins use the yellow wood as a substitute for sandal wood in their religious ceremonies.

Another "Wild Olive" is the product of *Terminalia Buceras*, Wright (N. O. Combretaceæ), called the "Black Olive" or "Olive Bark Tree." The leaves of the tree differ from those of the true olive not only in the way they grow, but also in being broader at the top than below. The berry is only a quarter of an inch long, with the remains of the calyx at the top. Related to this is *T. Hilariana*, Stend, a tree much resembling *T. Buceras*, and the berry is twice as large. Both are natives of the West Indies and the northern part of South America.

Bontia daphnoides, L. (N. O. Myoporineæ), is a shrub in the French West Indies, and known as "Olivier bâtard." The leaves are in shape like an olive, but they are not opposite. A decoction of the flowers is recommended for ophthalmia. The fruit is yellowish, nearly one-half an inch long, and when ripe contains an oil of a yellowish color, which is employed in colic and other irritations of the intestines. It may be that it is on this fruit the famous Ring Tail Pigeons get so fat and acquire their bitterish flavor.

The Director announces that they are ready to distribute young seedlings of an "*anti-malarial tree*," *Melaleuca leucadendron*, L. Regarding this tree,

Baron Sir F. von Mueller said in a letter: "This tree should become of the utmost importance also to the Western Hemisphere. As a tropical tree, fit to grow in malarian swamps and containing in its foliage much antiseptic and anti-miasmatic oil, it deserves your especial attention. It will grow where no eucalyptus could be reared." He further states in his "Select Extra Tropical Plants:" The Cajaput tree of India, North and East Australia, is found as far extra-tropical as 34° south latitude. This tree attains a height of about 80 feet, with a stem reaching 4 feet in diameter, on tidal ground; it can, with great advantage, be utilized on such intra-tropic areas and in salt swamps for subduing malarian vapors, where no eucalyptus will live. The lamellar bark protects it against conflagrations. It is splendid for fruit packing; oranges kept four months in it; lemons, five months; apples, 3 months. The wood is fissile, hard and close grained, regarded as almost imperishable underground, and resists the attacks of termites (white ants). It is well adapted for posts, wharf piles, shipbuilding and various artisans' work. The foliage yields the well-known Cajaput oil, so closely akin to eucalyptus oil. Mr. K. Staiger obtained on distilling the leaves as much as 2 per cent. of oil, which might be manufactured on a large scale from ample material in many parts of Australia. It is rich in Cineol. The tree should be extensively planted where yellow fever occurs."

BOTANIC GARDENS AND DOMAINS. Report for year 1897 from J. H. Maiden, Director Botanic Gardens, Sydney. This report deals particularly with the changes and additions made in the Botanic Gardens of Sydney. Among the items we note with regret that the large indigenous trees, those which were probably in their present position before Captain Cook visited these shores, are dying out. During the gale in August, 1897, a fine tree of white or cabbage gum (*Eucalyptus hæmastoma, var. micrantha*) fell down and smashed a seat made of 2-inch hardwood to splinters. Fortunately no one was injured.

ME OIRS OF THE AMERICAN ACADEMY OF ARTS AND SCIENCES. Cambridge: John Wilson & Son, University Press, June, 189.

In these memoirs is contained some new observations on the Planet Mercury (with 8 plates) by Percival Lowell. These observations tend to show that the Planet Mercury is an ellipsoid and a body somewhat larger than has been supposed, its polar diameter subtending a distance of about 33,000 miles. Rotating in 87.969 days its orbital period.

Its density is much less than the earth's. Its mass being probably about $\frac{1}{20}$ that of the earth's. It possesses no certain signs of atmosphere, water, vegetation or organic life. It is a world as dead as the moon, but differently brought to such condition.

COMPOSITION OF MAIZE (INDIAN CORN), INCLUDING THE GRAIN, MEAL, STALKS, PITH, FODDER AND COBS. Compiled chiefly from the Records of the Division of Chemistry, by W. H. Wiley, chemist of the Department of Agriculture, Washington, D. C.

An attempt has been made to briefly review the chief points connected with the constitution and economic value of the Indian-corn plant. It is predominantly the characteristic cereal crop of the United States, and its money value is, perhaps, greater than that of any one crop, with the exception of cotton. It has been shown that it is a valuable food for man and that it is the

chief food of the domestic animals of our great country. In addition to this, large quantities of starch are made from it, and also glucose and grape sugar. It not only serves as our food, but also furnishes a part of our drink, in the form of the various grades of Indian-corn whiskey. In addition to this, it is the source of an immense industry in the manufacture of alcohols, high wines and Cologne spirits. The stalks, which a few years ago were considered an injurious residue, have been found to possess most valuable properties as cattle food. Especially is this true of the outer shells. The inner portion of the stalk—the pith—possesses remarkable properties as an obturator in the manufacture of battle ships. It possesses a high degree of resilience and porosity, and when perforated by a shot or shell it instantly closes the aperture made by the projectile, and thus prevents the entrance of water into the vessel. It also has peculiar properties rendering it suitable for the manufacture of pyroxylin varnishes, gun cotton and high explosives. By reason of the nature of its construction it is easily nitrated. The acids are completely removed by washing, and the resulting compound is more stable, and, therefore, more valuable, than that which is derived from cotton under similar treatment.

It has been deemed wise to collect the above results of recent work which has been done in the Chemical Division of the Department of Agriculture on the subject of Indian-corn, especially because the merits of this plant are not well appreciated in Europe, where Indian-corn is not regarded as a fit source of human food, and where its genuine nutritive properties and the properties of the stalks are not known. It is believed that by calling the attention of the scientific men of Europe to Indian-corn, good will result, not only to the country which is interested in the growth of this great cereal, but to Europe, where cheap and nutritious food products are desired.

PROCEEDINGS OF THE AMERICAN ACADEMY OF ARTS AND SCIENCES. Vol. XXXIII. Reprints on the following topics have been received:

ON THE CAUSE OF THE RETENTION AND RELEASE OF GASES OCCLUDED BY THE OXIDES OF METALS. By Theodore W. Richards.

The evidence of this paper proves that in reality no discrepancy exists between the results of Scott (*Jour. Chem. Soc. Trans.*, LXXI, 559) and Morse and Arbuckle (*Amer. Chem. Jour.*, XX, 195) and those obtained at Harvard. The apparent disagreements were caused by the fact that the later experimenters investigated parts only of the whole field outlined in 1892 (*Proc. Amer. Acad. Arts and Sci.*, XXVI, 281). The paper also shows that the unequal escape of oxygen and nitrogen imprisoned in the oxides of metals is a phenomenon of great interest, capable of shedding light on the internal kinetics of solids.

A CONTRIBUTION TO THE STUDY OF INDIVIDUAL VARIATION IN THE WINGS OF LEPIDOPTERA. By William L. W. Field.

The author has worked upon the moth, *Thyreus abbotii*, Swamsin, one of the common Sphingidæ of Eastern North America. He offers the following hypothesis to explain the smaller variability of the sinuous margin in the females. The fact that the wing broadens so greatly toward the tip, and is provided with an irregular edge, suggests that this form of margin may be of advantage in rendering the insect less distinctly visible when its

wings are in rapid motion. The sinuous margin being of less importance, comparatively, for the male, we can understand its greater variability in the sex where it is less rigidly selected.

OCCURRENCE OF NATIVE COPPER AT FRANKLIN FURNACE, NEW JERSEY. By J. E. Wolff.

The occurrence of native copper here increases the long list of minerals found at Franklin furnace and vicinity (now nearly seventy) and is an interesting addition to the occurrence of native copper below the zone of surface oxidation.

EXHIBITION AND PRELIMINARY ACCOUNT OF A COLLECTION OF MICROPHOTOGRAPHS OF SNOW CRYSTALS, MADE BY W. A. BENTLEY. By J. E. Wolff.

The same general types of crystals noticed by previous observers recur here, such as the star form, star form with solid nucleus and tabular form, while the columnar form (hexagonal prism and base) is rare and the hexagonal pyramid is not seen. Mr. Bentley confirms the previous observations, that the large stellate crystals are more common at the higher temperatures and the tabular ones at the lower.

AN INQUIRY INTO THE NATURE OF ELECTRICAL DISCHARGES IN AIR AND GASES. By John Trowbridge.

According to the author, beyond 1,000,000 volts the initial resistance of atmospheric air to electrical discharges becomes less and less, and, in certain conditions, can be as low as 1,000 ohms between terminals two or three metres apart.

REVISION OF THE MEXICAN AND CENTRAL AMERICAN SPECIES OF GALIUM AND RELBANIUM. By J. M. Greenman.

DIAGNOSES OF NEW AND CRITICAL MEXICAN PHANEROGAMS. By J. M. Greenman.

Both of these papers by Dr. Greenman are of a systematic nature, and are contributions from the Gray Herbarium of Harvard University.

NOTES ON THE PROJECTIVE GROUP. By E. W. Rettger.

The author finds that a number of the sub-groups of the projective group in two or three variables are not properly continuous except in the neighborhood of the identical transformation.

MEETINGS OF THE BOARD OF TRUSTEES.

A special meeting of the Board of Trustees was held on August 26, 1898, by the direction of the President of the College, to take action relative to the death of Professor Henry Trimble, who died at noon on the 24th day of August. W. J. Jenks was made the Chairman *pro tem.*, and announced in a few words the object of the meeting and loss the College had sustained. The various members present gave personal attestation of their appreciation of Professor Trimble, of his devotion to duty, his untiring industry, his steadfast friendship and loyalty to the interests of the College. A committee, consisting of Jos. P. Remington, Chas. Bullock and Jos. W. England, were appointed to draft resolutions expres-

sive of the sense of the Board at his loss. The Board resolved to attend his funeral in a body.

The stated meeting of the Board was held on September 6th. Among other reports, the special committee to draft suitable resolutions by reason of the death of Professor Trimble, reported as directed, and a memorial notice was also prepared by Mr. Bullock. It was ordered that the latter be entered on the minutes, and that a copy, suitably engrossed, be presented to Mrs. Trimble.

The following is the memorial notice presented by Mr. Bullock:

At a special meeting of the Board of Trustees of the Philadelphia College of Pharmacy, held on the 26th day of August, 1898, the chairman announced the death of Professor Henry Trimble, in the forty-sixth year of his age, at his home in St. Davids, Delaware County, Pa.

The impressive silence that followed this announcement evidenced the sorrow felt by all present at the loss of one who had given the best years of his life to the service of this College.

The remarks made by members who had long been associated with him in College work were a just tribute to his memory.

He was highly esteemed for his personal character. His practical knowledge and scientific ability in the department which he had chosen for the work of his life was admired and appreciated. He possessed the faculty of imparting to others an interest in practical chemistry, and attracted to the laboratory of the College private students whose work has been a credit to the institution.

The success which attended his conduct of the Chemical Laboratory of the College demonstrated his ability as an instructor, and was recognized with great satisfaction by the Board of Trustees.

His work was not limited to instruction; the number of original investigations made by him were valuable additions to science. His work on the "Tannins" is the most complete monograph on that subject which has been published, and gained for him great credit for his labor, ability and the completeness of the work.

He also accepted the position of Editor of the AMERICAN JOURNAL of PHARMACY, and for nearly five years conducted it with success, contributing many valuable articles to its pages.

The mental activity of Professor Trimble was greater than his physical strength. His friends had noticed with sorrow indications of declining health, and advised him to seek quiet and rest during the summer months. His reply was characteristic of the man: "I would rather wear out than rust out."

He continued to work on a new edition of his Chemistry, in conjunction with Professor Sadtler, but was obliged to relinquish his part after a complete mapping out of the plan for its completion.

The loss to this College through the decease of Professor Trimble cannot be expressed in words. Those only who knew the value of his service as a member of the Faculty and of this Board, can appreciate the loss we have met with. His name will ever be gratefully remembered, and enrolled among those whom this College delights to honor.

The Committee on Instruction reported on the subject of providing for the conduct of the Chemical Laboratory, necessitated by the death of Professor Trimble. This report was carefully considered, and, after a full discussion of the subject, it was unanimously decided that the interest of the College would

be best served by placing the Laboratory during the coming year under the supervision of Prof. Samuel P. Sadtler, with Josiah C. Peacock, as assistant in charge, he having served in that capacity for several years under Professor Trimble.

THOMAS S. WIEGAND,
Secretary.

OBITUARY.

Dr. John Elishee De Vrij, C. I. E., died suddenly and unexpectedly on Sunday, July 31st, at his home in The Hague. He was born on January 31, 1813, at Rotterdam, where his father was a pharmacist. He was brought up to the profession of his father, and devoted himself with considerable studiousness to making himself a competent pharmacist. When he was but nineteen years of age his father died. Young de Vrij was the youngest of ten children, and his mother was dependent upon the pharmacy for their support. "By special royal dispensation de Vrij was authorized to submit himself for the qualifying examination, though he had not yet attained the minimum legal age." His previous efforts enabled him to successfully pass the examination with honors, and he carried on the pharmacy for eighteen years. He subsequently studied at Leyden University, and took his doctor's (Ph.D.) degree there in 1838. When his tutor, Mulder, was called to Utrecht University he was appointed lecturer in his stead in chemistry and pharmacy at the Medical-Pharmaceutical School at Rotterdam.

He began now to devote himself most assiduously to scientific work, although still keeping his pharmacy. He carried out a series of successful experiments which may be said to have laid the foundation of modern bacteriology.

"In 1847 he improved the processes for the manufacture of explosives, ultimately preparing nitro-glycerin and determining certain of its medical properties." He was a constant visitor to England at the meetings of the British Association for 1847–1851. These and other oft-repeated journeys to that country gained him the name, given him by Professor Graham, of the "Flying Dutchman." He also devoted himself to literary work, and made a Dutch translation of the famous Heinrich Rose's "Handbook of Analytical Chemistry." The result of this task brought him into direct correspondence with the foremost chemists of the day, among whom may be mentioned Pelletier, for whom Dr. de Vrij always entertained the highest regard and esteem.

In 1850 Dr. de Vrij saw his way clear to sell his pharmacy, and devote himself undividedly to his literary and scientific work. He had already published numerous papers on pharmaceutical subjects, as morphine, cherry laurel water, red phosphorus, etc. It may be mentioned that it was through Pelletier's influence and advice that he undertook certain investigations on the cinchona alkaloids. His researches attracted considerable attention, and induced the Dutch Government, in 1857, to send him as a supervisor of the development of cinchona plantations in Java. He remained there six years, and accomplished an immense amount of good in successful development of the cinchona industry. He then visited India and assisted the Indian Government in the cultivation of the cinchona and the extraction of alkaloids. For his services in this direction he was awarded by the Queen of England with the C.I.E. in 1880.

He has been the recipient of many honors. In 1856 he was elected an honorary

member of the Pharmaceutical Society of Great Britain. In 1869 he became an honorary member of the Philadelphia College of Pharmacy. In 1871 he was elected a member of the American Pharmaceutical Association; as also an officier de l' Instruction, and, in 1873, a corresponding member of the Paris Académie Médicale. "In 1880 he was appointed a companion of the order of the Indian Empire and when he was celebrating his jubilee, ten years ago, he was made a Knight of the Netherlands Lion." A year ago Dr. DeVrij was the recipient of the Hanbury gold medal. Only so recently as June 25th, Dr. DeVrij celebrated his diamond jubilee as a scientific man. On the day of his diamond jubilee the University of Utrecht conferred on him the degree of M.D., *honoris causa*, in recognition of the great services his cinchona researches had been to mankind.

His body was shipped to Gotha for cremation, as there is no crematory existing in the Netherlands. Dr. DeVrij took an active part in all pharmaceutical matters up to the day of his death. He was an ideal investigator—scientific, and yet practical. His name will ever be associated with the successful development of the cinchona and its chemistry. He not only developed its successful planting and studied its chemistry, but also its successful administration In Dr. DeVrij's quinadrops (being, according to J. B. Nagelvoort, an acid aqueous fluid extract of cinchona, containing about 5 per cent. total alkaloids, and easily miscible with water in all proportions) we have one of the most successful and popular of pharmaceutical preparations. Professor Flückiger wrote a few years ago for *Reber's Gallerie*, an interesting biography of this most eminent quinologist.

Gonorol is the name given to the alcoholic constituents of East Indian sandalwood oil. It has been ascertained (*Chemist and Druggist*, 1898, p. 250) that these bodies are the active constituents of the oil and that the other substances present tend to cause irritation when the oil is administered for urethral troubles. The dose and methods of administration are the same as for sandalwood oil.

Peeling Cinnamon.—The work of peeling the bark from cinnamon shoots is performed entirely by members of the challa caste (*Ibid.*, p. 180), who are very expert at the business, and transmit it as a sacred heritage from father to son.

Local Application of Methyl Salicylate.—Linnoissier and Lannois (*Bull. de l'Acad. de Med.*, March 22, 1898) speak highly of the local application of methyl salicylate to the joints in rheumatic affections. They contend that it is converted in the blood into sodium salicylate, and that there is produced a local analgesic effect without any gastric irritation. The part is painted with the methyl salicylate and covered with several layers of india rubber. The usual dose is one, but sometimes two or three drachms, in acute cases are employed.—*Univ. Med. Mag.*, 1898, p. 744.

"Waras," the Indian Dye Stuff has been investigated by A. G. Perkin (*Chem. News*, 1898, p. 20) who finds in it a number of principles, which are closely related to, though not identical with, those present in Kamala. Waras is a much stronger dye stuff than Kamala.

Henry Trimble

THE AMERICAN
JOURNAL OF PHARMACY

NOVEMBER, 1898.

HENRY TRIMBLE.

The ranks of American pharmacy have again suffered a loss, and one which, from the promise held out in a relatively short career, we cannot but term a severe one. Henry Trimble, for four years past the editor of this JOURNAL, has passed from our midst at the age of forty-five, having lived long enough to show that he could do good lasting work for his chosen profession, although he could not be said to have reached the zenith of his powers. The busy world makes small note of the death of one man, even when his sphere of activity has been a wide one, and the dropping from the ranks of a quiet scientific teacher and worker may not make much stir with the great public, may in fact pass almost unnoticed, but there are circles that will feel in his death a sense of personal loss. His power of devoted and loyal friendship to those to whom he once had given his confidence, made him a companion who will be missed sadly and not readily forgotten.

The subject of this memoir was born near Chester, Pa., on May 22, 1853, the son of Stephen M. Trimble, a member of the Society of Friends. He was brought up upon a farm, going to school in winter and working during the summer. His earlier education was obtained at the well-known Westtown Boarding School in Chester County, and at the age of nineteen he was apprenticed to learn the drug and apothecary business.

Two years later, in 1874, he entered the Philadelphia College of Pharmacy, the institution in which most of his subsequent active career was to be cast, and was graduated from the same in 1876. Desiring to supplement his course here by a fuller training he then

entered the University of Pennsylvania as a special student in chemistry, to which branch of scientific study he felt already strongly drawn. He continued here during two years, working in the analytical laboratory under the late Dr. F. A. Genth, taking the lecture courses in chemistry, mineralogy and botany, and for the last year of his time there, acting as lecture assistant to the writer of this memoir, who then held the chair of "General and Organic Chemistry" in the above-named institution.

During these years he applied himself with great fidelity and energy to the study of the several branches mentioned, and in particular, laid the foundations for that thorough acquaintance with analytical chemistry that he displayed in later years, when this became his special field of work.

When in the fall of 1878, the writer was called to the College of Pharmacy to take the lectures of the late Dr. Robert Bridges, then the Professor of Chemistry there, he took Henry Trimble as his lecture assistant there also. In this same year, 1878, he established himself in the retail drug business with his friend and classmate, C. W. Warrington, the two taking the business of their former preceptor, S. Mason McCollin, M.D., at Fifth and Callowhill Streets, in this city. In this business he soon showed that he had a practical side to his character and that he could turn his chemical education to useful account. Not satisfied with the list of preparations ordinarily made for sale by the retail druggist, he began the manufacture of artificial fruit ethers as a specialty, at first on a small scale and later in relatively large amounts. It is needless to say his products were unexceptionable in quality and soon acquired a name for themselves

Meanwhile, the chemical laboratory of the College of Pharmacy having also come under the care of Professor Sadtler by reason of the resignation of Dr. Fred. B. Power, who had been its director for a short time, Henry Trimble was given the active supervision of this, and in 1883, having retired from active connection with the drug business, he was given the full rank and title of "Professor of Analytical Chemistry" in the institution.

From this time on, all his energies and efforts were given to this work and the literature of pharmacy and chemistry will bear witness that all too short as was his term of scientific activity, he left his mark upon their pages.

As director of the chemical laboratory, he had to plan and super-

vise the work of advanced students, and each year many original investigations in analytical chemistry and proximate plant analysis were carried out under his guidance. The list of published articles which appeared in the AMERICAN JOURNAL OF PHARMACY under his name during the years 1875–1898 was fifty-three in number.

Already in 1890, he had begun to make a special study of the class of vegetable principles known as Tannins, being incited thereto by some investigations which he had made into the methods of dye-wood extract manufacture. The result of this was that in 1892 he published in a small octavo, the first volume of a work with the following title: "The Tannins, a monograph on the history, preparation, properties, methods of estimation, and uses of the vegetable astringents." In 1894 he followed this by a second volume, and at the time of his death had a large amount of unpublished notes which were meant to be used in a continuation of this unique publication. I say unique, because the work at once took rank in this country and abroad as the authoritative work on the subject, and Professor Trimble had for years carried on an extensive correspondence with botanists and chemists in all parts of the world upon what came to be known as his specialty. Both of these volumes contained a very complete bibliography of the subject, under the heading "An Index to the Literature of the Tannins," and the compilation of this bibliography involved an immense amount of painstaking care and research in the libraries of different scientific institutions and societies of this city, and examination of many foreign book catalogues.

In this connection, it should not be overlooked that Professor Trimble was an accomplished botanist, having taken special advanced instruction in this subject while a student at the University and afterwards from Professors Rothrock and W. P. Wilson.

This familiar acquaintance with the two domains of chemistry and botany made it an easy matter, therefore, for him to co-operate with his colleague, the late Prof. E. S. Bastin, in a series of joint articles on "Some North American Coniferæ," which appeared in the AMERICAN JOURNAL OF PHARMACY, and were reprinted in separate form in a pamphlet of some 124 pages.

He also became a contributor to *Garden and Forest*, published under the editorship of Professor Sargent, of Harvard University, and during the years 1894–98 furnished seven articles for this periodical. A more elaborate article on the Coniferæ was also con-

tributed by him to Sargent's monumental work, "Sylva of North America," appearing in Vol. XI.

In 1885 he published a small "Hand-book of Analytical Chemistry" for the use of his laboratory students. It ran through several editions, and was then merged into the "Text-book of Pharmaceutical and Medical Chemistry," first published by Professor Trimble and the writer jointly in 1895, and which has just appeared in a second revised edition.

Besides his activity at the College of Pharmacy, Professor Trimble also took part in the work of the Franklin Institute of this city, and several times lectured in the regular winter lecture course there. These lectures were always published in the *Journal of the Franklin Institute*.

Professor Trimble repeatedly received public honors which came to him as a recognition of his scientific attainments.

In 1895 he was selected as one of the Judges of Award for the Atlanta Exposition in the Forestry Section.

In 1896 he had the honorary degree of Master of Arts (A.M.) conferred upon him by Haverford College. His *Alma Mater* had previously (in 1891) conferred upon him the honorary degree of Master of Pharmacy (Ph.M.).

In 1897 he was elected a member of the American Philosophical Society, and because of his knowledge of the branch of sylviculture was made a member of the standing committee on the Michaux Legacy.

In 1894 he was elected editor of the AMERICAN JOURNAL OF PHARMACY to succeed the late John M. Maisch. This election at the hands of his fellow-members of the College of Pharmacy he recognized as a high honor, but at the same time as a position of large responsibility. In taking it, he determined to spare no effort to maintain the reputation given it by such predecessors in the editorial chair as Wm. Procter, Jr., and John M. Maisch, and if possible to make it still more acceptable to the pharmaceutical profession. So he threw himself with great energy into this new sphere of work. This editorial labor with the necessary correspondence and work of proof-reading for each monthly issue, which he would not delegate because of his feeling of personal responsibility proved too much for his strength already tasked quite sufficiently.

In the spring of 1897 he broke down partially and was forced

to give up some of his work. But improving somewhat, he took up his joint college and editorial work again and continued until in May, 1898, he was forced to place the editorship of the JOURNAL in other hands and seek entire rest.

But the seeds of a fatal disease were already sown, and in August came the end of his life's activity.

As before remarked, Henry Trimble has left his mark upon the literature of pharmacy and chemistry. Starting as a pharmaceutical apprentice himself and earning his way through College, every step of his career was carved out by his own exertions. His example may well be emulated by young men who start life with perhaps a fear that the difficulties ahead of them are too great and the rewards too remote or uncertain. He leaves behind him also for those who were privileged to know him well a precious recollection—that of a true-hearted and faithful friend, who was always the same and whose word could always be relied upon implicitly.

A widow and three daughters remain to cherish the memory of an affectionate husband and father. S. P. S.

PUBLISHED PAPERS OF HENRY TRIMBLE.

I. *American Journal of Pharmacy.*

1875. Assay of quinine pills.
1876. Benzoic acid as an antiseptic.
1877. Concentrated nitric acid.
Estimation of quinine.
1878. Analysis of dialysed iron.
1881. Preparation of formic ether.
1883. Milk analysis.
1884. Menthol.
1885. Glycerin vapors.
Oils of peppermint and spearmint.
Polygonum hydropiper (jointly with H. J. Schuhard).
Burdock Fruit (jointly with F. D. McFarland).
1886. Analysis of Yerba del Indio (jointly with S. S. Jones).
Analysis of Phlox carolina.
1887. Amyl acetate.
Laboratory notes.
1888. Sheperdia argentea.
Bitter principle of burdock fruit.
Catechu and gambier.
Precipitated ferrous sulphate.
Solid hydrocarbons in plants (jointly with Helen C. De S. Abbott).
1889. Canaigre.

1889. Some Indian plant foods.
Fabiana imbricata (jointly with H. J. M. Schroeter).
Oil of camphor (jointly with H. J. M. Schroeter).
Oils of wintergreen and birch (jointly with H. J. M. Schroeter).
Old sample of camphor oil (jointly with H. J. M. Schroeter).
1890. Eupatorium purpureum.
California soap plant.
Peucedanum Canbyi.
Some American galls.
Oils of wintergreen and birch (jointly with H. J. M. Schroeter).
1891. Carum Gairdneri.
Geranium maculatum (jointly with J. C. Peacock).
1892. Examination of some official preparations.
Purshia tridentata.
1893. Proximate principle from Phytolacca decandra.
Preparation of oak tannins, acetone a solvent (jointly with J. C. Peacock).
Canaigre tannin (jointly with J. C. Peacock).
1894. Four oak barks from India.
Cultivation of ginseng.
1895. Oils of wintergreen and birch.
Report on tannin from dragon's blood.
1896. Recent literature on soja bean.
Tannin of some acorns.
1897. Occurrence of strontia in plants.
Pomegranate rind.
Tannin of Castanopsis.
Tannin of Ceriops candolleana.
The soy bean.
The willow bark.
North American coniferæ (jointly with Prof. E. S. Bastin).
1898. An exudation from Larix occidentalis.

II. *In Garden and Forest.*

1894. Pin oak (Quercus palustris).
1895. On the tanning properties of the bark of three North American trees.
1896. Salt and sugar in Washingtonia filamentosa.
Tannin value of North American trees.
Tannins of the palmetto.
1897. Source of abietene.

III. *In Franklin Institute Journal.*

1887. Tannin, its present and future sources.
1892. Chestnut bark tannin.
1897. Recent advances in the study of the resins.

PROFESSOR TRIMBLE'S BOOKS.

I. *Hand-book of Analytical Chemistry, 8vo. P. Blakiston, Son & Co.*
1st edition, 1885.
2d edition, 1886.

3d edition, 1889.
4th edition, 1892.

II. *The Tannins—a Monograph. J. B. Lippincott Co.*

Vol. I, 1892.
Vol. II, 1894.

III. *Text-book of Pharmaceutical and Medical Chemistry* (*jointly with S. P. Sadtler*).

1st edition, 1895. J. B. Lippincott Co.
2d edition in two volumes, 1898. J. B. Lippincott Co.

FLUID ACETRACTS.

By Joseph P. Remington.
Research Committee E., Pharmacopœia Revision.

The title of this paper, "Fluid Acetracts," will doubtless strike the pharmaceutical reader as an innovation and inasmuch as innovations in pharmacy are resented by many, it is only proper to endeavor to forestall unfavorable criticism by giving reasons for selecting a title. To those who have followed the efforts which have been made within the last few years to call attention to the uses of acetic acid as a menstruum and solvent for organic substances, there will be no occasion to explain the meaning of the word *acetract.* We have had acetic extracts in the past, and by this term is meant a solid extract made from a drug by the use of acetic acid; the word *acetract* may simply be regarded as a contraction of the words *acetic extract.* Inasmuch as the United States Pharmacopœia of 1890 recognizes mainly alcohol and water as menstrua, it would be clearly improper to call preparations made with acetic acid, extracts and fluid extracts; for the sake, then, of avoiding confusion in nomenclature it has been deemed best to use acetract and fluid acetract to mean solid and liquid preparations of organic drugs made with acetic acid as a menstruum.

Since writing the paper on this subject (which will be found in the American Journal of Pharmacy for March, 1897), the writer has continued experiments upon a number of drugs and has had the opportunity of observing the effect of age upon these preparations. Since this paper (March, 1897) was written, the effort has been made to use as weak an acetic acid as possible and, as was anticipated,

some drugs can be very successfully exhausted with a menstruum containing as little as 5 per cent. of acetic acid; but so far, the strength which seems to be most successful is a 10 per cent. menstruum. It is not to be supposed that acetic acid can replace alcohol as a menstruum in all cases, but from the work which has already been done, the writer feels warranted in stating that fully one half of the official fluid extracts could be satisfactorily replaced by fluid acetracts. The manufacturers of specialties have not been slow to adopt acetic acid for extracting drugs, and the saving in expense has been enormous. The cost of diluted acetic acid—10 cents per gallon—as compared with that for alcohol—$2.50 per gallon—is entirely too great a temptation to resist, and a manufacturer would certainly be foolish to use alcohol except when required by the authority of the Pharmacopœia.

Sanguinaria has always presented the greatest difficulty in selecting a menstruum for the fluid extract which would not precipitate the alkaloid. I have great pleasure in stating that this question is now settled so far as obtaining a liquid preparation, which does not precipitate, is concerned. A fluid acetract of sanguinaria is herewith exhibited, a cubic centimetre representing a gramme of the drug, made on the 26th of July, 1892, and which has never at any time within the last five years, shown the slightest sign of precipitation. It seems necessary, however, to use a 60 per cent. acetic acid to accomplish this, for it will be seen by examining the samples that fluid acetract of sanguinaria, made with diluted acetic acid, contains an abundant precipitate.

The fluid acetract of ipecacuanha, made with 60 per cent. acetic acid is two years old, and seems to be in excellent condition, no precipitation being observed. The effect of acetic acid upon pectinous drugs presents some curious anomalies. Sixty per cent. acetic acid seems to act as a solvent for the pectinous principles, for, whilst weaker strengths produce liquid acetracts which will gelatinize, no tendency toward gelatinization is observed in the 60 per cent. fluid acetracts.

One fact is noticeable in light-colored preparations, that is, a tendency to darken with age. The fluid acetract of squill herewith shown, was of a light amber color when first made; in two years it has become a clear, dark red. When added to syrup, however, in the proper proportion to make syrup of squill, it will be observed

that the resulting preparation is not very different from that which is official.

Fluid acetract of ergot is very successfully made with a 10 per cent. acetic acid menstruum. Since the publication of the paper above referred to (1897), many letters of inquiry upon the subject have been received, and it is evident that acetic acid is being extensively experimented with in many laboratories. It is with a view of encouraging investigations on this subject that these papers are written, and any information in the possession of the writer will be cheerfully furnished, in the hope that sufficient experience will have accumulated in two years more, to warrant the introduction of some of these preparations in the next Pharmacopœia. Dr. Charles F. Squibb has furnished the writer with nine specimens of fluid extracts made with diluted acetic acid, which are submitted to the meeting for inspection. They are as follows: Digitalis, cascara sagrada, aconite root, nux vomica, belladonna leaf, compound gentian, gelsemium and coca. It will be observed that these represent some of the most important official drugs. They have all been made by repercolation, and on the large scale it is found that it is possible, with drugs like nux vomica, to use such, very coarsely ground instead of in fine powder, the acetic acid seeming to penetrate hard tissues and to dissolve the active constituents with great facility.

The presence of acetic acid in the finished product is, of course, sometimes objectionable. Practically, this would not be a serious fault in fluid acetracts made from powerful drugs where the dose is from 2 to 5 minims, given in water, and where only a 10 per cent. acetic acid is used for a menstruum.

CANTHARIS VESICATORIA.

By Bertram Snyder, Ph.G.

The Spanish blistering beetle belongs to the class Insecta, order Coleoptera, family Meloidæ. The following is a description of the insect (*Fig. 1*) found in commerce: Oblong, somewhat flattened above, usually ¾ inch, though often found 1 inch or more in length; $\frac{3}{16}$ to ¼ inch in breadth. The entire insect is of a brilliant metallic green color, changing in different parts, especially beneath, to a golden green. Head: triangular, and divided by a faint median

line into two lateral lobes. Mandibles stout, and partly concealed beneath the labrum. Clypens distinct. Antennæ filiform, composed of conical joints; three basal joints, green or bluish green, the remainder of a black color. Eyes comparatively small and compound, placed on the anterior portion of the lateral lobes and to the side. Ocelli absent. Thorax: the dorsal surface of the prothorax is quadrilateral, tapering from above to the sternum, having the appearance of a wedge placed between the head and mesothorax. Scutellum very small. Legs with five tarsal joints. Elytra covering the abdomen, and extending a short distance over the pleural surface. The Spanish blistering bettle, though the only one official, is by no means the only one possessing vesicating properties. It is found in the southern and central portions of Europe. In its native state

FIG. 1.—Cantharis Vesicatoria.

it chiefly feeds upon the leaves of the plants belonging to the Oleaceæ and Caprifoliaceæ, but as a larva it is parasitical. The female insect deposits its eggs during June, and the larvæ, when hatched, attach themselves to bees or other Hymenopterous insects. The insects are gathered during the early morning and late in the evening, when they are less active from the cold. The persons who gather them protect their hands with gloves and usually wear masks. The trees or shrubs are shaken, and the insects fall into sheets spread on the ground. They are killed by exposure to the fumes of vinegar or by turpentine, dried by artificial heat and packed in paper-lined boxes.

The beetles may be kept for any length of time in air-tight bottles without losing their vesicating property, but on exposure to moist

air the cantharidin is decomposed and the beetles become useless. They are also much injured by the attacks of other smaller insects, particularly by a small mite, which entirely consumes the soft inside portions, leaving the hard external shell intact. They may be preserved from these attacks to some extent by the addition of small pieces of camphor, or, better, by exposing the beetles to the vapor of pyroligneous acid.

The commonly-called Chinese blistering beetle (*Mylabris cichorii*) (*Fig. 2*) found in some portions of Southern Europe and in China, has acquired some note. The body is of an elongated oval or cylindrical fórm, from ¾ to 1 inch in length, and from $\frac{3}{16}$ to $\frac{5}{16}$ inch in breadth. Head of a jet-black color, somewhat triangular; maxillary palpi three-jointed; mandibles stout and large, almost concealed

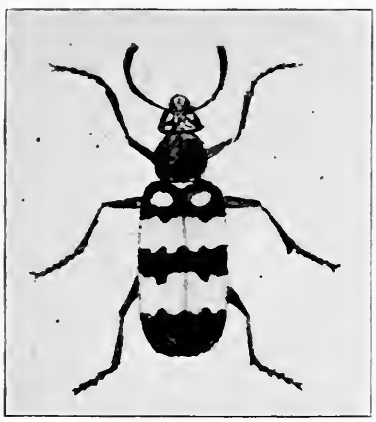

FIG. 2.—Mylabris Cichorii.

beneath the labrum; clypens rather large; antennæ clavate eleven-jointed and articulated to the front of the head, below and between the eyes; eyes large and compound; the facets or corneæ are discernible with a pocket lense; they are situated on the side of the head and rather far apart; ocelli absent; prothorax decidedly wedge-shaped, of a black color with faint prominences and depressions on its dorsal surface; præscutum very small; scutellum of an oval shape; the femora of the first and second pair of legs are clothed with yellowish hairs; third pair jet black; elytra black with two broad-waved transverse bands of brownish yellow, in some species examined of a golden-yellow color; on the anterior portion of each elytom there is a circular spot of the same color; abdomen rather

large and conical, entirely concealed by the elytra, which not only project beyond the posterior portion, but also cover the sides, which is characteristic of the blistering beetles. The blistering beetles are well represented in this country, and it is to be regretted that they have not a place in the U. S. Pharmacopœia, as they are in no wise inferior to the *C. vesicatoria* in vesicating properties. The most common are *C. vitatta*, *C. cineria*, *C. marginati*, *C. atrata*, and *C. vulnerata*. The best known is *C. vitatta* (*Fig. 3*), commonly called potato fly. It is somewhat smaller than *C. vesicatoria*, being from ½ to ¾ inch in length and about $\frac{3}{16}$ inch in breadth. It is of a black color, with the exception of ochreous markings; the under portion of the body is cinereous; head cordate of a light ochre color, with two black spots on the apex; mandibles entirely concealed by the

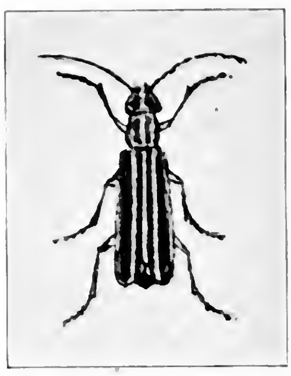

FIG. 3.—Cantharis Vitatta.

labrum; labial palpi two-jointed, the last joint large and flattened; maxillary palpi three-jointed; antennæ black and filiform; clypeus large; eyes large and compound, extending over the lower side of the head; prothorax elongated and much narrower than the head, of a black color, with a brownish yellow central and a faint lateral line; coxæ of the first pair of legs much elongated; the articulated portion of the femora are of an ochre color; the other portions are cinereous; scutellum small; elytra are black, with a median and marginal stripe of yellow; they slightly overlap the pleurites. The whole insect is covered with a fine pubescence.

The vesicating properties of the blistering beetles reside in a crystallizable substance termed cantharidin, and according to some writers,

in a green fixed oil; but this is no doubt due to the presence of cantharidin, which is soluble to some extent in the oil.

A portion of the powdered cantharides was treated with carbon disulphide and set aside to macerate. On decanting the liquid and subjecting it to spontaneous evaporation, a thick, dark brownish-green oleaginous matter was obtained, which was insoluble in alcohol, soluble in ether, chloroform and benzin. It melted at 18° C., below which it was solid. It was entirely soluble in excess of ether, which on partial evaporation separated out a yellowish-brown fat; when entirely evaporated and the fat separated by filtration, a light pea-green oil was obtained, which raised a small blister in eight hours without any covering, the oil being placed on the back of the hand. Alcohol and water both dissolve an extractive matter. The alcoholic extract was soluble in ether and acetic ether.

A separate portion of the powdered beetle, on treatment with chloroform, yielded, after evaporation, an abundance of crystals of cantharidin along with dark fatty matter, which was removed by CS_2 and the cantharidin redissolved in a fresh portion of chloroform and recrystallized. A small portion of this cantharidin raised a large, painful blister in four hours on the same part of the hand to which the oil was applied. The distillation of the powdered cantharides with water affords a volatile principle which is vesicating. While treating the powder that was used in the distillation with alcohol and then evaporating the solution by means of heat, I stood over it at intervals stirring with a glass rod. At night I was much annoyed by a scratching sensation in closing the lids over the eyes. Next morning intense inflammation had set in. On consulting a physician he stated that I must have been using some irritating substance in my eyes. I was compelled to stay in a dark room for twenty-four hours; for a few days after had to use a shade.

Boric acid, 6 gr., camphor water, ʒii, and distilled water, ℥i, using three drops in each eye allayed the irritation. I noticed that the irritation of the left eye was much worse than the right. In stirring the evaporating solution I leaned on the counter with my left arm, thus exposing the left eye more to the vapor.

Camphor.—The value of crude camphor exported in 1897 from North Formosa was £121,938, the trade being mostly in the hands of German and Chinese merchants.—*Chem. and Drug.*, 1898, 256.

ANALYSIS OF THE ROOT OF HYDRANGEA PANICULATA, VARIETY GRANDIFLORA.

By August G. Luebert, P.D.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 180.

Hydrangea paniculata, variety grandiflora, is a cultivated hybrid of Hydrangea paniculata. It is a showy annual shrub, having very large panicles of sterile flowers, which open late in August, or early in September. It is one of the most commonly cultivated shrubs in the Northern and Middle States.

As far as I am able to learn, there is no record concerning the chemistry of this plant. The American Journal of Pharmacy for 1887 contains on page 122, however, an essay on the chemistry of Hydrangea arborescens, a closely allied species. Mr. C. S. Bondurant, the author of the essay just referred to, obtained, from both the alcoholic and ethereal extracts of the plant, a distinctly crystalline body; this, he proved to be a glucoside, and named it *hydrangin.* It crystallized in stellate clusters. On addition of an alkali to the aqueous solution, a very distinct and strong opal-blue fluorescence was observed; this was destroyed by acidifying. It melted at 235° C., and on increasing the temperature slightly, it sublimed without decomposition. A characteristic reaction was obtained on dissolving it in sulphuric acid, and adding a small crystal of potassium bichromate, a dark purple color being produced. This color, after some minutes, faded to violet, and, on addition of a few drops of water, changed to an olive green color, which gradually faded.

The work of the present writer consisted in making a proximate analysis of the root of the variety grandiflora. Dragendorff's method of analysis was followed. The root was reduced to No. 40 powder for this purpose.

Petroleum ether having a boiling point of 50° C. removed 1·20 per cent. of soluble matter. This consisted of wax, saponifiable fat, and caoutchouc.

Official ether extracted 2·39 per cent. of the weight of the root. The extract was granular in appearance and waxy in consistence. It had a characteristic, sweetish odor, which somewhat resembled that of the root. The extract was digested with water, and the mixture filtered. The filtrate was agitated with several successive portions of ether, the ether separated and allowed to evaporate. A

crystalline residue was obtained; it was purified by recrystallization. The crystals were similar to those obtained from the portion of the ethereal extract which was insoluble in water, but soluble in alcohol. These are yet to be described in this paper. The aqueous layer, from which the crystals had been removed by ether, was heated on a water-bath to expel the ether, and then warmed with Fehling's solution. This reagent was reduced, thus showing the presence of a sugar or a glucosidal body.

That part of the ethereal extract which was insoluble in water was entirely soluble in absolute alcohol. The solution deposited crystals on standing. These crystals gave no reactions for alkaloids. On mixing water with a portion of the crystals, and making a part of the resulting mixture alkaline with solution of sodium hydrate and applying Fehling's solution with heat, there was a reduction of this reagent. Another portion of the mixture was made acid with dilute sulphuric acid, heated on a water-bath for some time, then made alkaline and treated with Fehling's solution; the last was again reduced. The treatment with dilute sulphuric acid left a resin-like, insoluble substance of a brownish color, while the supernatant liquid acquired a decided fluorescence. This fluorescence was removable by filtration. The foregoing behaviors indicate that the principle itself reduces Fehling's solution, or that it is decomposed by alkalies and acids, with the production of a substance which reduces Fehling's solution. From a concentrated ethereal solution, the principle crystallized in branched clusters. It was charred by sulphuric acid, and upon adding a crystal of potassium bichromate, a darker color and an effervescence were produced. The principle melted at 178° C. These properties show that it is not identical with the *hydrangin* found by Bondurant. The name, *para-hydrangin*, is suggested for the substance until further investigation shall decide its exact chemical identity.

Absolute alcohol dissolved 14·49 per cent. of extract from the root. The extract was partly soluble in water; the remainder was soluble in alcohol. The aqueous solution contained some of the crystalline principle that was found in the aqueous solution of the ethereal extract. The alcoholic solution of that part of the absolute alcohol extract insoluble in water gave no precipitate with alcoholic solution of ferric chloride. Lead acetate in alcoholic solution caused a yellowish-brown flocculent precipitate. A third portion of the

alcoholic solution of the extract yielded a precipitate when mixed with water, but it could scarcely have been resin since neither aqueous nor alcoholic solution of potassium hydrate dissolved it. This extract contained 2·38 per cent. of sugars, calculated as glucose, and 0·7 per cent., calculated as saccharose.

Water removed 3·60 per cent. of organic solids from the root. This amount included 2·42 per cent. of mucilage, and a trace of dextrin. Sugars were not found in this extract.

A weak solution of sodium hydrate was the next solvent applied to the root. It extracted 15·88 per cent. of organic matter. A portion of the alkaline solution was acidified with acetic acid and precipitated with five times its volume of alcohol. A precipitate amounting to 7·30 per cent. of the root was obtained. Lassaigne's test gave no indication of nitrogen in this precipitate, consequently it was composed of mucilage.

The root yielded 4·88 per cent. of soluble organic matter to a weak solution of hydrochloric acid in water. This extract contained 2·37 per cent. of the substance known as pararabin.

Starch was present in the air-dry root to the extent of 9·46 per cent.

The air-dry material contained 7·94 per cent. of moisture, and 8·12 per cent. of ash.

The cellulose, lignin and allied substances amounted to 32·04 per cent.

SUGGESTED PROCESS FOR DEODORIZED TINCTURE OF OPIUM.[1]

By E. L. Patch.

At the Montreal meeting I was requested to report upon this process which was stated to be as follows:

Granulated opium	100 grammes.
Benzinum U.S.P.	400 c.c.

Macerate 24 hours and decant. Macerate residue with 200 c.c. of benzine for 24 hours, decant upon a filter, wash the filter with 200 c.c. of benzine and dry the opium at a gentle heat. Macerate the opium in 300 c.c. of warm water for 24 hours, transfer to a perco-

[1] Presented at the Baltimore Meeting of the American Pharmaceutical Association.

lator, wash with warm water to 800 c.c., add 200 c.c. of alcohol, filter and assay.

The supposed advantages of the process consist in the use of benzine in place of the more costly ether for the removal of narcotine, etc., and the employment of a granulated opium in place of the fine powder. The official process allows 200 c.c. of ether for washing 100 grains of opium. The suggested process allows 890 c.c. of benzine. The relative solubilities of morphine and narcotine in various solvents, are stated to be as follows:

	Morphine.	Narcotine.
Cold water	1 in 33,000	1 in 25,000
Boiling water	1 " 500	1 " 7,000
Cold alcohol	1 " 40	1 " 80
Boiling alcohol	1 " 30	1 " 20
Amyl. alcohol	1 " 400	1 " 300
Chloroform, U.S.P.	1 " 175	1 " 3
Ether	scarcely soluble	1 " 166
Benzole	" "	1 " 22
Benzine	" "	scarcely soluble

Different observers do not agree upon the solubility of these bodies and their solubility appears to be largely influenced by physical condition, while the stated solubilities are those of pure alkaloids and not of the combinations existing in the drug.

The morphine existing in the drug as meconate, a salt quite readily soluble in water and alcohol, may be more soluble in other solvents than is generally understood. The narcotine existing in a free condition, has nearly the same range of solubilities as given for the pure alkaloid. In exhausting the opium with water a large proportion of the narcotine is supposed to be rejected. In exhausting first with ether, 100 grammes of opium, containing 6 grammes of narcotine, would theoretically require about 1,000 grammes of ether, or ten times its weight, and an indefinite quantity of benzine.

Benzinum.—The benzine of the pharmacopœia is defined as a transparent, colorless, *odorous* liquid, of sp. gr. from 0·670 to 0·675 and boiling point of 50° to 60° C. It should evaporate without residue.

Sample No. 1.—Purchased as benzine, had a sp. gr. @ 15° C. of 0·6914.

1000 c.c. yielded 30 c.c. of distillate below 50° C.
165 c.c. between 50° and 60° C.
195 c.c. " 60° " 73° C.
610 c.c. above 73° C.

Sample No. 2.—Purchased as gasoline, had a sp. gr. of 0·6886 @ 15° C.

1000 c.c. yielded 95 c.c.	of distillate	below 50° C.	
190 c.c.	"	"	between 50° C. and 60° C.
375 c.c.	"	"	" 60° C. and 73° C.
340 c.c.	"	"	above 73° C.

Sample No. 3.—Purchased as gasoline, had a sp. gr. of 0·650 @ 15° C.

1000 c.c. yielded 750 c.c.	of distillate	below 50° C.	
140 c.c.	"	"	between 50° C. and 60° C.
60 c.c.	"	"	" 60° C. " 73° C.
50 c.c.	"	"	above 73° C.

The mixed fractions boiling below 60° C. forming a mixture having a sp. gr. of 0·6450 @ 15° C. was employed in the process.

Experiment No. 1.—500 grammes of No. 40 opium, assaying 16·1 per cent. morphine, was treated exactly as suggested in proposed process. The benzine-washed opium was dried in a drying closet at 55° C. for three days, then made into 5000 c.c. of deodorized tincture, sample of which is submitted as No. 6.

It assayed but 1·334 per cent. morphine. The ether washings from 100 c.c. used in assay gave a residue of 0·720 yielding an abundance of narcotine. The finished product has an odor of gasoline. It is evident that more benzine must be used, that it is very difficult to get rid of the odor, and that instead of instructing to percolate 100 grammes to 800 c.c., the directions should be to percolate to *exhaustion*, evaporate to 800 c.c. and add 200 c.c. of alcohol. It is difficult to decant the benzine without carrying through the filter some portion of the opium in suspension, as noted in the accompanying sample of benzine washings.

Experiment No. 2.—100 grammes of No. 40 opium, assaying 16 per cent. morphine, was macerated with frequent shaking for 24 hours in 700 c.c. of benzine, the benzine decanted, the residue macerated 12 hours with 350 c.c. of benzine, the benzine decanted, the residue washed upon a filter with 350 c.c. of benzine and the opium dried several hours at 70 C. The residual opium weighed 91 grammes. If there had been no loss of morphine in the process, it should have assayed 17·58 per cent. by the equation

91 grammes : 100 grammes : : 16 per cent. : 17·58 per cent.

It did assay 16·54 per cent., showing an appreciable loss. The

benzine washings evaporated gave 8·17 grammes of residue, containing crystals of narcotine. This benzine residue washed with water and the water washings evaporated, gave 0·280 grammes of residue free from morphine. The benzine residue washed with water acidulated with 2 per cent. of sulphuric acid, the washings neutralized with ammonia and extracted with ether chloroform, 0·180 grammes of alkaloid was obtained, which gave reactions for narcotine.

A sample of this benzine washed No. 40 opium is submitted, marked and numbered No. 3. Made into deodorized tincture standardized at 1·3 per cent; it has a foreign odor and is not satisfactory. See sample of deodorized tincture No. 3.

Experiment No. 3.—A quantity of natural opium assaying 12.8 per cent., was cut into very thin slices and extracted with twenty times its weight of cold water, used in successive portions in an agitator. The cold water solution was evaporated to syrupy consistence and shaken with a large excess of benzine. It emulsified badly and was separated only after the expenditure of much time and patience. After separation the benzine was expelled from the residue by continuous heat with stirring, upon a steam bath. The residual extract was 56 per cent. of the weight of the original opium. If no loss had occurred, it should have assayed 22·85 per cent. It did assay 18·47 per cent. A sample of this extract is submitted with a sample of deodorized tincture marked and numbered No. 7.

It is known that the opium is more readily extracted with warm water, but more coloring matter and odorous principle pass into solution by use of heat. To compare the use of other solvents further experiments were conducted, as follows:

Experiment No. 4.—100 grammes of No. 40 opium, 16 per cent., washed with 1400 c.c. of ether, as in experiment No. 2. The ether washed opium weighed 80·5 grammes. If there had been no loss it should have assayed 19·87 per cent. of morphine. It did assay 18·12 per cent. Sample of this ether-washed opium and of deodorized tincture made from it, are submitted, marked No. 1.

Experiment No. 5.—100 grammes of No. 80 opium 16 per cent., treated as above, gave 78 grammes of residual opium assaying 19·14 per cent. in place of 20·51 per cent. that it should assay if there had been no loss.

Experiment No. 6.—A quantity of natural opium assaying 12·8

per cent. morphine, extracted with cold water, the washings evaporated to very soft extract, the extract redissolved in ten times its weight of distilled water, filtered from precipitated matter, concentrated to syrupy consistence, washed with ether until 10 c.c. of ether washings evaporated in a porcelain capsule gave only a slight residue, the opium solution evaporated to an extract, the extract weighed 53 per cent. of the original opium and assayed 20 per cent. morphine, in place of 24·15 per cent. that it should assay if no loss had occurred in the exhausting, heating, precipitating, etc. This extract is very clean, entirely soluble in a mixture of water four volumes and alcohol one volume, and yields a very superior deodorized tincture. A sample of the extract, one of the extract reduced to 14 per cent. with milk sugar, and of the deodorized tincture made from the extract, are submitted. It is evident that the 200 c.c. of ether used for washing 100 grammes of opium in the official process for deodorized tincture, is insufficient. There is no uniformity in quantity required on account of difference in character of the opium employed. Sample of deodorized tincture marked B. has had three ether washings, and sample C. the same number, while sample D. has had six. Comparison of these samples will show their variation in character.

It would be better if the U.S.P. directed repeated ether washings in its process for deodorized tincture, or washing until slight residue is obtained on evaporation of 10 c.c. of ether washing, if any uniformity in product is intended. To ascertain if loss in these processes came from imperfect exhaustion in using gum opium, 25 pounds of natural opium, assaying 13 per cent., was washed with two successive portions of lukewarm water, each portion four times the weight of the opium used. Assay showed 1·7 pounds loss. Further washing with three additional washings gave 0·8 pounds as loss. Duplicate experiments gave very similar results.

Experiment No. 7.—100 grammes of No. 40 opium assaying 16 per cent. was extracted with redistilled acetone of sp. gr. 0.8172 @ 15° C., as in Experiment No. 2. The residual opium weighed 74 grammes and assayed 19·34 per cent. morphine, in place of 21·62 per cent. that it would have assayed if there had been no loss. The residue retained the acetone odor after long heating at 70° C., and subsequent exposure to the air. The deodorized tincture made from it retains the acetone odor. Sample of the acetone washings,

of the acetone-washed opium No. 4, and of deodorized tincture made from it, are submitted.

Experiment No. 8.—100 grammes of No. 40 opium assaying 16 per cent., washed with methyl acetate, freshly redistilled, of sp. gr. 0·9268 @ 15° C. gave 77·5 grammes of residue assaying 19·6 per cent., instead of the 20·64 per cent. it would have assayed if no loss had occurred. The methyl acetate odor persistently adhered to the residue, and after several months' standing is apparent in the deodorized tincture made from it. Sample of the methyl acetate washings, the residual opium and deodorized tincture made from it, are submitted, marked and numbered 5. The various morphine residues obtained in the assays are submitted for comparison.

A.—The ether washings from 100 grammes of No. 40 opium, Experiment No. 4, evaporated to dryness, the residue extracted with water and submitted to morphine assay, gave 0·0155 gramme. The water-washed residue washed with 2 per cent. sulphuric acid, the acid washings neutralized with ammonia and washed out with ether-chloroform, gave 4·425 grammes of alkaloids testing for narcotine.

B.—The ether washings from 100 grammes of No. 80 opium, Experiment No. 5, treated in the same way as *A*, gave 0·0145 gramme of morphine and 4·435 grammes of alkaloids (narcotine, etc.).

C.—The acetone washings from 100 grammes of No. 40 opium, Experiment No. 7, treated in the same way as *A*, gave 0.580 gramme of morphine and 4·860 grammes of alkaloids (narcotine, etc.).

D.—The methyl acetate washings from 100 grammes of No. 40 opium, Experiment No. 8, treated in the same way as *A*, gave 0·080 morphine and 5·160 of alkaloids (narcotine, etc.).

COMPARISON.

Lots of 100 grammes of No. 40 opium assaying 16·1 per cent. morphine, washed respectively with 1400 c.c. of benzinum, ether, acetone and methyl acetate, gave the following results:

	Benzine.	Ether.	Acetone.	Methyl Acetate.
Weight of extracted and dried opium .	91·00	80·500	74·	77·50
" " morphine in " " .	15·05	14·580	14·310	15·19
" " " " washings . . .	none	·015	·580	·08
" " narcotine, etc., in washings .	·18	4·425	4·860	5·16

CONCLUSION.

Benzinum, or petroleum ether, is not adapted for use in washing narcotine, etc., from opium in making deodorized tincture, on account of its uncertain character, its low range of solvent power, and its disagreeable odor. Methyl acetate or acetone are much better because of greater uniformity and greater solvent power, but are inferior to ether because of their disagreeable odor.

QUALITATIVE EXAMINATION OF POWDERED VEGETABLE DRUGS.

By Henry Kraemer.

(*Continued from No. 10, p. 521.*)

GROUP No. 3. COLOR, SOME SHADE OF YELLOW.

Washed sulphur, Sulphur præcipitatum, U.S.P. (Lac Sulphur or Milk of Sulphur), Mastic, Glycyrrhiza (Russian), Aurantii amari cortex, Scammony resin, Resina, Lycopodium, Sandarac, Sinapis alba, Dextrin (yellow), Aurantii amari cortex, Aurantii dulcis cortex, Ammoniac, Limonis cortex, Zingiber (Jamaica), Calendula, Angustura bark, Tr. Rhei Dulc., Rhamnus purshiana, Tr. Rhei Arom., Rheum, Hydrastis, Resina podophylli, Aloes (Cape), Chrysophanic acid, Gamboge, Turmeric, Yellow ochre, (Argillaceous or Calcareous earth, Fe and Mn oxides), Curry powder.

I. POSSESSING VEGETABLE TISSUES OR CELL CONTENTS.

A. CELL-CONTENTS ALMOST ENTIRELY.

a. Starch grains.

204. *Dextrin.*—Altered and unaltered starch grains.

b. No starch.

205. *Lycopodium.*—Characteristic spores entirely.

B. CELL-CONTENTS AND VEGETABLE TISSUES.

a. Without any or but little starch.

206. *Aurantii Amari Cortex.*—Thick-walled parenchyma (walls 10–15 μ thick); oil secretion reservoirs (120 μ in diameter); few ducts; brownish-green outer layer; crystals of calcium oxalate cubical (15 x 15 μ).

207. *Aurantii Dulcis Cortex.*—Parenchyma cells with walls not so thick as the bitter orange peel, being 4 μ thick; secretion reservoirs

about 350 μ in diameter; few ducts; outer layer orange-yellow; crystals of calcium oxalate either cubical (30 x 30 μ), or prismatic, as in quillaja (35 x 10 μ); likely to find sphere crystals of carbohydrate in glycerin mounts.

208. *Limonis Cortex.*—Secretion reservoirs as large as in sweet orange peel; outer layer pale (lemon) yellow; walls of parenchyma 5 μ thick; calcium oxalate crystals, about as in bitter orange peel; sphere crystals, as in sweet orange peel.

209. *Sinapis alba.*—Oil, aleuron and characteristic seed coat.

210. *Calendula.*—Characteristic tissues of petals containing oily drops; few pollen grains; reaction with H_2SO_4.

b. Containing starch.

a. Without crystals of calcium oxalate.

211. *Hydrastis.*—Starch 4 μ; wood fibres and ducts yellowish; few, sometimes numerous prismatic crystals in a rosette = berberine; upon addition of H_2SO_4 get abundant needle-shaped crystals.

β. With crystals of calcium oxalate.

* Crystals very small and likely to be overlooked.

212. *Zingiber* (Jamaica).—Unaltered starch grains 15 x 30 μ; yellowish (oil) and reddish (resin) cells; fibrovascular tissue.

213. *Turmeric.*—Altered starch grains (test with iodine) in irregular masses (70 x 100 to 100 x 140 μ) of shape of cell in which formed; bright yellow oil secretion cells; pigment dissolved out by use of solutions of chloral or chloral-glycerin, as well as when essential oils are employed; characteristic color reaction with H_2SO_4, or with boric acid + HCl, and then evaporate with NH_4OH.

214. *Curry Powder.*—A powder of varying composition, but generally find the following: characteristic yellow secretion cells and starch of *ginger* and *curcuma;* oil and seed coat of *mustard;* aleuron and oil secretion reservoirs of *coriander;* may find sklerenchyma of *Pimenta* or *cloves.*

** *Crystals of calcium oxalate rosette-shaped and numerous.*

215. *Rheum.*—Crystals 70 μ; starch grains, single, 20 μ, or double 35 x 20 μ; boil a few milligrammes of the powder with water, filter, and to the straw-colored solution add KOH = red coloration.

216. *Tr. Rhei Aromatica.*—Chiefly the characteristics of *Rhubarb* (see No. 215); crystals (10 μ), and oil secretion reservoirs of *cloves* (see No. 346); tissues of *cinnamon* (see No. 292) and *nutmeg* (see No. 496).

217. *Tr. Rhei Dulcis.*—Characteristic aleuron, non-secreting hairs and secretion reservoirs of *anise;* seed coat and crystals of *cardamom*, crystals in crystal fibres of *glycyrrhiza*; crystals and starch of *rheum.*

219. *Rhamnus Purshiana.*—Rosette-shaped and cubical crystals; bast fibres (more numerous than in Frangula); stone cells (which are absent in Frangula); a few milligrammes of powder boiled with water, filtered and the straw-colored filtrate, treated with KOH, gives a red color.

*** *Crystals cubical, tetragonal or coffin-shaped and numerous.*

220. *Calumba.*—Stone cells contain tetragonal crystals; starch grains. (See No. 24.)

221. *Glycyrrhiza* (Russian).—Numerous sklerenchyma fibres, adjoining which are crystal fibres containing tetragonal and coffin-shaped crystals; few cork cells, distinguishing it from Spanish (which see, No. 275); some parenchyma cells contain glycyrrhizin, and are colored straw-yellow with H_2SO_4.

**** *Needle-shaped crystals.*

222. *Angustura.*—Stone cells; bast fibres; long yellow secretion reservoirs; yellowish (oil) and reddish-brown (resin) masses.

II. FEW OR NO FRAGMENTS OF VEGETABLE TISSUES.

A. BURN, GIVING OFF ODOR OF SO_2.

223. *Sulphur Lotum.*—Small rounded masses in chains.

224. *Sulphur Præcipitatum.*—Small rounded masses in irregular groups in glycerin mounts.

B. ON BURNING DO NOT GIVE OFF ODOR OF SO_2.

(*a*) *Nearly colorless in glycerin mount.*

225. *Mastic.*—Transparent irregular masses.

(*b*) *Yellowish in glycerin mount.*

(*α*) *Containing oil globules.*

226. *Scammonium.*

β. Transparent or translucent.

227. *Resina.*—Irregular masses, soluble in cold alcohol (95 per cent.), forming a straw-colored liquid, becoming milky-white on addition of water; on heating fragments of resin in water, they melt, run together and form a sticky mass.

228. *Sandarac.*—Almost insoluble in alcohol (95 per cent.), and

solution remains almost colorless; on heating fragments in water, do not melt.

229. *Resina Podophylli.*—Very small more or less globular particles frequently massed together in large masses.

230. *Aloes* (*Cape*).—In glycerin mount some fragments are conchoidal; the particles become clear and dissolve, leaving a few colorless lens-shaped or fine acicular crystals. The latter are more abundant in the Barbadoes aloes.

231. *Chrysophanic Acid.*—Small, colorless and yellowish irregular masses, with KOH, becomes yellow and then crimson-red.

(γ) *More opaque.*

232. *Ammoniac.*—Irregular, faint yellow, opaque masses, made up of small, light-colored or grayish particles.

233. *Gamboge.*—Irregular, bright yellow masses, made up of small yellow particles.

GROUP No. 4. COLOR TAN, BUFF, ECRU TO DARK BROWN OR BROWNISH, BLACKISH AND BLUISH BLACK.

Belladonnæ radix, Ipecac (Rio), Ulmus, Galla (Aleppo), Canella alba, Calamus, Quillaja, Physostigma, Wheat middlings, Elaterium, Althæa, Bryonia, Benzoin, Lappa, Althæa (unpeeled), Apocynum cannabinum, Apocynum androsæmifolium, Apocynum album, Horse nettle, Hydrangea arborescens, Pulv. Ipecac. et Opii, Pulv. Jalap. Co., Asclepias, Jalapa, Colchici cormis, Quassia, Inula, Aurantii amari cortex, Aurantii dulcis cortex, Limonis cortex, Pulv. Morph. Co., Pyrethrum, Aconitum, Podophyllum, Pareira brava, Rubus, Gelsemium, Euonymus, Ext. Sarsap. Fld. (powder), Ipecac (Carthagena), Cardamom (seeds and capsules), Cardamom, Vanilla and Sugar, Cort. Myrica cerifera, Lappa, Cusso, Sumbul, Sambucus, Taraxacum, Zingiber (African), Pulv. Glycyrrh. Co., Asafetida (stony), Glycyrrh. (Spanish), Zingiber (Jamaica), Tr. Gentian. Co. (powder), Phytolacca, Syr. White Pine Comp., Anthemis, Gossypii rad. cort., Rumex crispus, Goa powder, Gentian, Santonica, Valeriana, Cascarilla, Xanthoxylum (Southern), Foeniculum, Tonka, Tobacco (pipe), Sabina, Rosa centifolia (pale), Chenopodium, Sarsaparilla (American), Xanthoxylum, Aralia spinosa, Zingiber (African), Insect powder (Dalmatian), Viburnum prunifolium, Aspidosperma, Powd. Opium, Cinnamon (Ceylon), Cinnamon (Saigon), Tr. Cardamom. Co. (powder), Tr. Lavandula. Co. (powder), Aloes and Canella,

Ext. Glycyrrhizæ, Tr. Catechu Co. (powder), Carum, Foeniculum, Pulv. Aromaticus, Coriander, Pimenta, Tobacco (cigar), Colchici sem., Guarana, Myristica, Caryophyllus, Cinnamon (Saigon), Cinchona nigra, Sassafras, Cinnamon (Cassia), Cinnamon (Ceylon), Quercus alba, Viburnum prunif., Cinchona flava, Tr. Cinch. Co. (powder), Composition (powder), Prunus virg., Geranium, Stillingia, Iris, Aloes (Barbadoes), Aloes (Soc.), Aloe et Canella (Hicra picra), Catechu, Cantharides (Russian), Clove stems, Goa powder, Cinnamon (Cassia), Conium fruit, Cubeb, Catechu, Larkspur seed, Corn Smut, Powder of Charcoal, Magnesia and Ginger, Willow charcoal, Amylum iodatum.

I. ANIMAL TISSUES.

Fragments on being ignited on platinum foil give off odor of burning animal substance.

A. DO NOT COLOR MOUNTS OF GLYCERIN OR GLYCERIN + CHLORAL.

234. *Cantharis* (*Russian*).—Not hairy.
235. *Mylabris Cichorii.*—Very hairy.

B. GLYCERIN MOUNTS COLORED A CARMINE RED.

236. *Coccus.*

II. PRESENCE OF VEGETABLE TISSUES BUT NO FIBRO-VASCULAR ELEMENTS.

237. *Ergota.*—See No. 1.

III. FIBRO-VASCULAR ELEMENTS AMONG OTHER VEGETABLE TISSUES.

A. CONTAINING STARCH.

a. Possessing calcium oxalate crystals.

α. *Crystals rosette or star-shaped.*

238. *Althæa* (*peeled*).—Crystals 25 μ; starch 14 x 10 μ; sklerenchyma fibres; mucilage; crystals of asparagin.

239. *Althæa* (*unpeeled*).—As No. 238 but with appreciable quantity of cork cells.

240. *Aralia nudicaulis.*—See No. 2.

241. *Aralia spinosa.*—See No. 3.

242. *Asclepias.*—Crystals 35 μ (sometimes not numerous); starch 7 μ; numerous stone cells.

243. *Cascarilla.*—Crystals 15–20 μ; starch 3 μ; reddish brown secretion cells; sklerenchyma fibres.

244. *Canella alba.*—Crystals 20–30 μ; starch single to 3-compound (5 μ in diameter); large yellowish oil secretion reservoirs; peculiar stone cells thickened on but three sides.

245. *Composition powder.*—Starch, oil cells and crystals of Ginger (see No. 212); crystals and oil secretion reservoirs of cloves (see No. 346); oil and chromoplastids of capsicum (see No. 306); bayberry bark with characteristic crystal fibres and starch grains 7 μ.

246. *Euonymus.*—Crystals 20–35 μ; starch 4 μ; characteristic groups of bast fibres with 5–8 rows of medullary rays.

247. *Galla* (*Aleppo*).—Crystals 10 μ; starch single grains (10 μ) or sometimes in groups; stone cells; tannin; crystals of gallic acid.

248. *Geranium.*—Crystals, 60 μ; starch, 10–15 μ; numerous yellowish and reddish-colored masses in cells; strong reaction for tannin.

249. *Gossypii Radicis Cortex.*—Crystals, 25 μ; starch, single (4 μ) to 3 to 4 compound (20 μ) grains; long bast fibres about 6 m.m. long; secretion reservoirs; reddish and yellowish-colored masses.

250. *Jalapa.*—Crystals, 30–35 μ; much starch of characteristic form (18–36 μ); yellowish-brown secretion cells, as well as other characteristic, somewhat thickened cell with simple pores.

251. *Juglans.*—Crystals generally rosette-shaped (15–35 μ) or sometimes tetragonal (10 x 15 μ), occurring in parenchyma or occasionally in crystal fibres; bast fibres, 30 μ wide and very long; stone cells, 35 x 50 μ; oily drops and purplish-brown tannin masses in parenchyma. *J. cinerea*, L., is distinguished from *J. alba*, Mx., and *J. nigra*, L., in that each of the latter possesses numerous crystal fibres containing prismatic or rhombohedral crystals. *J. nigra* has also in the medullary rays rosette-shaped crystals of calcium oxalate. *Juglans regia* appears more nearly to resemble *J. cinerea*, L. See Vogl.

252. *Myrica cerifera.*—Crystals either rosette-shaped (45 μ) or nearly cubical (15 x 15 μ to 15 x 20 μ), occurring in crystal fibres (as in licorice) accompanying the long bast fibres, which are as many as 100 μ in width and walls about 25 μ thick; starch either single (7 μ) or 2 to 4 compound.

253. *Podophyllum.*—Crystals, 50 μ in diameter; starch either

single grains (5–8 μ), or 2 to 6 compound; numerous single yellow cells or groups of the same; sklerenchyma fibres and ducts.

254. *Pimenta.*—Crystals, 15 μ; starch, 7–10 μ; stone cells characteristic; oil secretion reservoirs are wine-colored and characteristic.

255. *Pulv. Aloe et Canellæ* (*Hiera Picra*).—In addition to Canella alba (see No. 244) there is aloes, the appearance of which depends on the kind used (see Nos. 230, 486 and 487).

256. *Pulv. Jalapæ Co.*—In addition to Jalapa (see No. 250) has large irregular transparent crystals of potassium bitartrate (see No. 186).

257. *Pulv. Rhei Comp.*—Crystals and starch of Rheum (see No. 215); oil and starch of ginger (see No. 212), and crystals MgO (see No. 197).

258. *Hufland's Baby Powder.*—Crystals and starch of *Rheum* (see No. 215); carbonate of magnesia and sugar (as Oleo-sacch. of Fennel).

259. *Rubus.*—Crystals, 30 μ; starch 7 μ; long bast fibres, 7 mm. long; reddish and yellowish-colored masses.

260. *Rumex crispus.*—Crystals, 20–35 μ; starch, 10–18 μ; stone cells and sklerenchyma fibres; boil few milligrammes with water, filter and to straw-colored liquid add KOH = red chrysophanic acid reaction. In *Rumex hymenosephalus* starch grains characteristic, 4 x 8 to 7 x 16 μ; apparently no crystals.

261. *Serpentaria.*—Sometimes contains crystals (see No. 245).

262. *Stillingia.*—Crystals not numerous apparently (35 μ); starch (15 x 15 to 25 x 30 μ); sklerenchyma fibres very long, diameter, 20 μ; walls swell very perceptibly in KOH; oil secretion cells containing oil and reddish resin masses.

263. *Syr. Trifolii Comp.*—Rosette crystals, etc., of *Stillingia* (see No. 262); cubical crystals, stone cells and oil secretion reservoirs of *Xanthoxylum fraxineum* (see No. 29); tissues of *Lappa* (see No. 113); *Phytolacca* (see No. 301); *Berberis aquifolium* (see No. 557); *Cascara amarga* and *Red clover.*

264. *Sarsaparilla* (*American*).—See Aralia nudicaulis, No. 2.

265. *Viburnum prunifolium.*—Crystals, either rosette-shaped (35 μ) or cubical (15 μ), or somewhat coffin-shaped, occurring in crystal fibres like in licorice; numerous groups of yellowish stone cells (20 x 140 μ) of various shapes of numerous light cork cells;

more stone cells and fewer sklerenchyma fibres in *V. prunifolium* than in *V. opulus*.

266. *Syr. White Pine Compound.*—See No 285.

β. Tendency of crystals to cubical, tetragonal, hexagonal, or coffin-shape.

267. *Aspidosperma.*—Crystals, 14–25 μ, in crystal fibres about 8 mm. long, very characteristic.

268. *Calamus (peeled).*—Few crystals 7 x 10 or 5 x 5 μ in crystal fibres in outer part of cortex; sometimes get large acicular crystals in glycerin mounts about 55 μ long, which may be, however, 400 μ long; starch, 4 x 4 to 4 x 8; parenchyma characteristic; oil secretion cells; ducts and sklerenchyma.

269. *Calamus (unpeeled).*—More crystal fibres like in licorice and Uva ursi. (See No. 268.)

270. *Cardamom.*—Crystals very small; starch in small grains, often in groups; thick, dark sklerenchyma being the outer and particularly the inner epidermis of the seed; the pericarp or fruit wall possesses sklerenchyma fibres and large parenchyma cells, some of which contain brown masses. The *Malabar* is distinguished from the *Ceylon* in that the latter has some 1-celled hairs; crystals are larger and more numerous; starch grains are larger; the outer epidermal cells are larger and contain one or more nearly cubical or hexagonal crystals. (See also Vogl and Mœller.)

271. *Cinnamon.*—See No. 292, sometimes find prismatic crystals.

272. *Ext. Glycyrrhizæ.*—Irregular wine-colored fragments; starch grains altered and unaltered; few fragments of sklerenchyma and crystal fibres of glycyrrhiza. (See No. 276)

273. *Ext. Sarsaparillæ Fld.*—Abundance of tissues and starch grains of sarsaparilla (see No. 40); sklerenchyma and crystal fibres of glycyrrhiza (see No. 275); tissues of sassafras (see No. 313); and mezereum (see No. 524).

274. *Frangula.*—Rosette-shaped crystals, 70 μ, cubical, pentagonal and hexagonal crystals (7 x 5 μ to 8 x 8 μ) in parenchyma cells or crystal fibres; starch grains not numerous, the grains occurring either singly or in groups; long, numerous bast fibres 15 μ wide; after section or powder lies in glycerin get numerous small globular and yellowish particles; boiling a few milligrams of the powder with water, filtering, and to the straw-colored liquid adding KOH gives a red coloration. Absence of stone cells in *Frangula* distinguish it from *Rhamnus Purshiana*.

275. *Gelsemium.*—Crystals cubical (15 x 15 μ), tetragonal (15 x 20 μ) or prismatic (8 x 28 μ); starch grains 8 x 8 μ; numerous sklerenchyma fibres. Stem is distinguished from the root by the presence of groups of more or less altered sieve (*i e.*, internal phlœm). Rhizome is distinguished from overground stem by the former having a stronger cork development and the latter chloroplastids.

276. *Glycyrrhiza* (*Spanish*).—Crystals of varying shapes, about 3 x 2 μ, occurring in crystal fibres in fragments of about 117 μ in length; starch grains about 5 μ in diameter; ducts and numerous sklerenchyma fibres. Spanish licorice is distinguished from the Russian in that a powder of the former is darker, due to the fact that the cork is retained and hence cork cells are relatively more numerous.

277. *Ginger, Charcoal and Magnesia.*—Few starch and oil secretion cells of ginger (see No. 212); crystals of MgO (see No. 197), and large number of wine-colored or blackish wood fragments.

278. *Hufland's Baby Powder.*—Crystals and starch of rheum (see No. 215), crystals of MgO (see No. 197) and sugar (see No. 185).

279. *Iris.*—Crystals of shape like those of Quillaja; they arise in the intercellular spaces, and in powder are in broken pieces about 20 x 150 μ in size; parenchyma loose; cells contain reddish resin; ducts numerous.

280. *Krameria.*—Large crystals in shape like Quillaja, ranging from 10 x 45 to 25 x 110 μ, or even larger; starch 20–30 μ; bast fibres 400 to 875 μ long; about 15 μ wide and with a peculiar crook or bend; parenchyma containing bright, reddish-brown coloring substance. Bast in *Savanilla* rhatany longer and broader than *Peruvian* (see also Vogl).

281. *Myrica cerifera.*—See No. 252.

282. *Prunus Virginiana.*—Crystals rosette-shaped, cubical or hexagonal (20–30 μ); starch 4 μ; stone cells; bast fibres; taste and odor.

283. *Pulv. Glycyrrhizæ Co.*—Tissues of glycyrrhiza (see No. 275), and senna (see No. 21). Make chrysophanic acid test.

284. *Quillaja.*—Crystals prismatic varying from 15 x 60 to 35 x 100 μ, or even larger; starch 10 μ; sklerenchyma fibres; parenchyma with yellowish resin.

285. *Syr. White Pine Comp.*—Crystals, fibres and stone cells of *wild cherry* (see No. 281); characteristic crystals, etc., of *Aralia*

spinosa (see No. 3); tissues of *sassafras* (see No. 313), sanguinaria (see No. 222), white pine bark and balm of gilead buds.

286. *Ulmus.*—Hexagonal or coffin-shaped crystals 8 x 25 μ; starch 5–7 μ; groups of bast fibres and characteristic large mucilage cells.

287. *Viburnum Opulus.*—Crystals cubical (2 x 2 μ) or broadly prismatic (10 x 20 μ) in crystal fibres. More sklerenchyma fibres in *V. Opulus* than in *V. prunifolium.* (See No. 265.)

288. *Viburnum prunifolium.*—See No. 265.

289. *Xanthoxylum.*—Tetragonal crystals 10 x 25 μ; starch 4–10 μ; large colorless secretion reservoirs; reddish cork; acicular crystals separate in glycerin mounts; apparently no bast or stone cells as in *X. fraxineum.* (See Mœller.)

γ. *Raphides (or needle-shaped crystals) of calcium oxalate.*

290. *Cacao.*—Acicular crystals of theobromine and fat. (See No. 545.)

291. *Calamus.*—Acicular crystals in glycerin mount. (See No. 268.)

292. *Cinnamon.*—Raphides of calcium oxalate; stone cells; bast fibres; starch grains. The different cinnamons are distinguished in powder in that the *Ceylon* has little or no cork; *Cassia* has more lignified cells than *Saigon; Saigon* is more aromatic and pungent. The mounts of Ceylon cinnamon are lighter in appearance than those of either of the others. Regarding other characteristics the following may be of some service in distinguishing these barks; *Cassia* has, on an average, starch grains 7 μ diameters; stone cells 60 μ wide; bast fibres 700 μ long; *Ceylon* has starch grains 3–7 μ diameter; stone cells 70 μ wide; bast fibres 60–100 μ long; *Saigon* has starch grains 10 μ diameter; stone cells 85 μ wide; bast fibres 750 μ long.

293. *Hydrangea arborescens.*—Needles 200 μ long; starch 4–15 μ; numerous sklerenchyma fibres.

294. *Ipecac.*—Acicular crystals 20–40 μ long; starch in single and 2–3 compound grains; tracheids, but no true ducts. Starch grains of *Rio Ipecac* on average 4–7 μ. may be 14 μ; that of *Carthagena* varies from 4--15 μ, the grains being uniformly larger. *Richardsonia* has true ducts.

295. *Pulv. Aromaticus.*—Tissues and cell-contents of Cinnamon (see No. 292) and Ginger (see No. 212) predominating; also Cardamom (see No. 23) and Nutmeg (see No. 496).

296. *Pulv. Ipecac. et Opii.*—Crystals of sugar-of-milk predominating (see No. 190); also Ipecac (see No. 294) and Opium (see No. 222).

297. *Tr. Catechu Comp.*—Tissues, etc., of Cinnamon (see No. 292) and Catechu (see No. 222).

δ. Crystal sand. (May occur as acicular crystals also.)

298. *Belladonnæ Radix.*—Starch in single (5–15 μ) and 2–3-compound grains; rather narrow ducts, with bordered pores; few sklerenchyma fibres; grayish-brown resinous masses. *Woody Belladonna* has more numerous ducts and sklerenchyma fibres; *Mealy B.* is richest in starch, and *Horny B.* is richest in grayish-brown resinous masses.

299. *Cinchona.*—Starch 4 μ in diameter, not very abundant; characteristic bast-fibres 600 μ long by 50 μ wide; alkaloids can be crystallized out sometimes by use of KOH.

300. *Horsenettle* (*Solanum Carolinense*).—Starch occurs in single (25 x 35 to 10 x 20 μ) or 2–4-compound grains; sklerenchyma and ducts.

301. *Phytolaccæ Radix.*—Acicular crystals 30 μ long or crystal sand; numerous starch grains 7–18 μ in diameter; large ducts; fragments of cork; sklerenchyma fibres short and long.

302. *Quassia* (*Surinam*).—See No. 358.

303. *Tinct. Cinchonæ Comp.*—Bast-fibres of *Cinchona* (see No. 303); parenchyma of *bitter orange peel* (see No. 206); sklerenchyma of Serpentaria (see No. 145).

304. *Zingiber* (*African*).—See No. 318.

(*b*) Containing starch, but few or no crystals of calcium oxalate and rather numerous fragments of tissues.

α. Possessing oil-cells or secretion reservoirs ∴ of characteristic odor.

305. *Calamus* (*unpeeled*).—The crystal fibres occur only in outer portion of cortex, hence powder may contain few crystals; starch 4 x 8 to 4 x 4 μ; ducts and sklerenchyma; loose parenchyma; colorless or slightly yellowish oil-secreting cells.

306. *Capsicum.*—Starch grains very small; peculiar wavy stone-cells of seed, besides stone-cells of epicarp and endocarp; oil containing dissolved pigment of chromoplastids; characteristic secretion hairs of calyx; powder with H_2SO_4 becomes purplish and then purplish-red.

307. *Colchici Semen.*—See No. 326.

308. *Cubeba.*—Starch 1–4 μ in diameter; occurring also in aggregated masses; stone-cells (50 x 50 μ), those of endocarp twice as long as wide; sklerenchyma fibres; needle-shaped crystals (cubebin) occur in stalk; much oil in numerous oil secretion reservoirs.

309. *Cinnamon.*—Crystals may not be observed. (See No. 292.)

310. *Piper nigrum.*—See No. 100.

311. *Sabina.*—Starch 4 μ; characteristic hypodermis consisting of long fibres (15 μ wide) associated with epidermis.

312. *Sanguinaria.*—Starch grains single (4–8 μ), seldom 2–4-compound; orange and reddish-colored secretion cells; mounts in glycerin are apt to contain sphere crystals.

313. *Sassafras.*—Starch grains single and 1–3-compound (7–20 μ diameter); bast fibres 455 μ long x 20–30 μ wide, being spindle-shaped much as in Cinchona; yellowish and purplish-yellow fragments containing tannin; oil-cells.

314. *Stillingia.*—Crystals may not be numerous. See No. 262.

315. *Sumbul.*—See No. 125.

316. *Syr. Trifolii Comp.*—See No. 263.

317. *Valeriana.*—Starch in single (7 μ) or 2–3-compound grains; oil in cells near hypodermis; peculiar cork; root hairs; sometimes in cells of epidermis or near them crystals (Valerianic acid salt) occur.

318. *Zingiber* (*African*).—Crystals likely to be overlooked. Distinguished from *Jamaica ginger* by possessing more numerous oil and resin cells and cork cells.

β. Sklerenchyma as stone cells or fibres.

319. *Aconiti Radix.*—Starch in single (4–12 μ) and compound grains, much resembling Colchici Cormis; tabular *stone cells;* ducts; reddish-brown endodermis; taste characteristic.

320. *Apocynum.*—Starch; sklerenchyma and laticiferous vessels; ducts with bordered pores. In *A. album* starch 4–10 μ; stone cells 35 x 70 to 50 x 70 μ, with few large pores; bast fibres may not react readily, if at all, with phloroglucin; wood fibres react with phloroglucin; thick cork. In *A. androsæmifolium* starch 4–20 μ; stone cells 13 x 10 μ, possessing numerous fine pores; bast fibres may be absent; when present, behave towards phloroglucin like *A. album.* In *A. Cannabinum* do not find stone cells or bast fibres; wood fibres are affected by phloroglucin; starch grains 7 x 15 to 10 x 10 μ, being larger than the other two; more numerous yellowish or

nearly colorless fragments of laticiferous vessels than in the other two; numerous fragments of the yellowish and reddish-brown cork.

321. *Black Mustard Hulls.*—Characteristic stone cells and pigment cells of seed coat.

322. *Capsicum.*—See No. 306, stone cells.

323. *Chenopodium.*—See No. 108, stone cells.

324. *Coffee.*—Characteristic fragments of seed coat made up of parenchyma and spindle-shaped stone cells (175–200 μ long and 35 μ wide); most of the cells are those of endosperm with brownish-colored walls, porous, 10 μ thick and contain oil, aleuron and starch. In commerce ground coffee is either made from the true coffee seed or is an artificial mixture of cereals, chicory, etc.

325. *Colocynthis.*—See No. 549.

326. *Colchici Semen.*—Starch 7–15 μ; characteristic thick-walled endosperm cells with simple pores and containing oil globules and protein; reddish-brown fragments of seed coat, the brown coloring matter soluble in KOH.

327. *Cubeba.*—See No. 308.

328. *Guarana.*—Parenchyma (60 x 70 μ) containing aggregated more or less altered starch grains (10 x 10 μ); stone cells (25 μ in diameter) nearly isodiametric; sklerenchyma fibres; on addition of KOH needle-shaped crystals (caffeine) may be obtained.

329. *Pareira.*—Yellowish stone cells (70 x 45 μ) occurring in groups; numerous starch grains, either single (7 x 10 to 15 x 15 μ) or compound; wood fibres.

330. *Physostigma.*—Starch, 25 x 40 μ; stone cells, also characteristic palisade sklerenchyma; stone cells, the contents of which are reddened by alkalies; oil and protein as granular masses.

331. *Phytolaccæ Radix.*—See No. 301.

332. *Podophyllum.*—Crystals sometimes apparently wanting; starch in single (5–8 μ) or 4 to 6 compound grains; numerous single cells or groups with yellowish resin; sklerenchyma fibres and ducts.

333. *Sassafras.*—See No. 313.

334. *Serpentaria.*—See No. 145.

(*c*) Containing starch; few tissue fragments and no calcium oxalate crystals.

335. *Amylum Iodatum.*—More or less angular grains (7–20 μ) of corn starch, colored uniformly dark blue; on focussing above on the grain the edge is light blue.

336. *Bryonia.*—Starch in single (10–17) or two or more compound grains; sometimes find long acicular crystals (200 μ); ducts, 35–60 μ wide; cork yellow and yellowish-colored cells, associated with ducts as in Colchici cormis; with H_2SO_4 powder colored purplish and reddish-brown.

337. *Colchici Cormis.*—Starch in single (7–15 μ) and 2 to 4 compound (35 x 35 μ) grains; sometimes find needle-shaped crystals (70–200 μ long); few spiral ducts (21 μ wide); with H_2SO_4 powder colored reddish-brown (port wine color).

338. *Opium.*—In glycerin mounts consists of more or less grayish-brown and irregular granular masses (35–50 μ in diameter); little or no starch; epidermis of capsule cells, 40 x 40 μ in width, having lumen 7 x 7 μ; taste bitter and sparingly soluble in water or KOH. May get test for alkaloids with use of KOH. The *Smyrna* opium has most epidermal cells of capsule; the *India* few or none, and the *Persian* very little. The *Persian* always has an appreciable amount of starch. (See also Tschirch.)

339. *Tonka.*—Numerous starch grains, either single (5 x 7 μ) or aggregated; parenchyma containing brownish-red coloring substance; much oil.

B. WITH LITTLE OR NO STARCH.

(*a*) Containing calcium oxalate crystals.

a. Crystals rosette or star-shaped.

340. *Anisum.*—See No. 8.

341. *Carum.*—Crystals (1 μ) in aleuron (3 μ); characteristic brownish oil secretion reservoirs and epidermis of seed coat and pericarp.

342. *Chimaphila.*—See No. 12.

343. *Conium.*—See No. 13.

344. *Coriander.*—Crystals (3 μ) in aleuron (10 μ); light yellowish oil secretion reservoirs, with epidermis of seed coat and pericarp.

345. *Cusso.*—Crystals (20 μ); spherical pollen grains (25 μ); single celled, non-secreting hairs (210 μ long); small secretion hairs with a stalk; stone cells.

346. *Cloves.*—Crystals, 10–15 μ; numerous secretion reservoirs (125 x 125 μ to 120 x 210 μ; pollen grains somewhat triangular (15 μ); parenchyma loose; few bast fibres with the bundle. Heat powder with KOH get needle-shaped crystals possibly due to eugenol.

347. *Clove Stems.*—Numerous rosette-shaped, but also cubical ($7 \times 7\ \mu$) crystals; sklerenchyma fibres 30 μ wide; numerous *stone cells* ($30 \times 100\ \mu$ to $100 \times 100\ \mu$); oil secretion reservoirs not so large or numerous as cloves.

348. *Fœniculum.*—Crystals (2 μ) in aleuron 6 μ; brownish oil secretion reservoirs with characteristic inner epidermis of pericarp running at right angles to the same; thickened latticed parenchyma.

349. *Quassia* (Surinam).—See No. 358.

350. *Santonica.*—Crystals 10 μ; pollen grains, spherical (15 μ); sklerenchyma fibres; secretion hairs containing crystals (santonin) soluble in alcohol and ether; powder, with H_2SO_4, becomes immediately blood-red. Santonica distinguished from *Artemisia* by the characteristic T-non-secreting hairs of the latter.

β. Crystals cubical, tetragonal or prismatic.

351. *Aurantii Amari Cortex.*—See No. 206.

352. *Aurantii Dulcis Cortex.*—See No. 207.

353. *Gaultheria.*—See No. 17.

354. *Gentian.*—Contains some small colorless or yellow prismatic crystals (may be calcium oxalate); in glycerin large prismatic crystals ($5 \times 15\ \mu$) separate (possibly a sugar); spiral (30 μ wide), and scalariform (50 μ wide) ducts; yellowish oil globules; powder with Fe_2Cl_6 dark brown; characteristic "ersatzfasern" accompanying the sieve.

355. *Hamamelis.*—See No. 33.

356. *Illicium.*—Prismatic crystals (4–10 μ) of a stearopten in inner epidermis of seed coat; most characteristic are the sklerenchyma, of which there are 3–4 forms, of these the palisade sklerenchyma is most characteristic; loose parenchyma; oil in cells. In *I. religiosum* the stone cells are thicker than *I. anisatum*, and on treatment with KOH the latter becomes port wine red and the former a dirty orange-brown.

357. *Insect Powder.*—See No. 19.

358. *Limonis Cortex.*—See No. 208.

359. *Quassia.*—Cubical crystals (15 μ) in wood parenchyma; ducts and wood fibre. The *Jamaica quassia* is distinguished from *Surinam*, in that the medullary rays of the former are 2–3 rows wide, whereas in Surinam they are but 1 row wide. In *Jamaica* we also find in addition crystal sand. When bark is ground with the

wood the *Surinam* powder is distinguished by the presence of stone cells and rosette-shaped crystals of calcium oxalate. The latter are found only to a small extent in *Jamaica.*

360. *Quercus alba.*—Cubical crystals (15 μ), in crystal fibres 20 μ wide; large groups of characteristic stone cells; long bast fibres, which are 40 μ wide; colorless or light yellow parenchyma stained deep black with Fe_2Cl_6.

361. *Sambucus.*—Small crystals in calyx. See No. 474.

362. *Uva Ursi.*—See No. 37.

363. *Vanilla.*—Crystals, tetragonal and prismatic (7 x 17; 10 x 25; 7 x 35 μ) or needle-shaped (200–300 μ long); characteristic papillæ upon inside of pericarp; characteristic broadly ovate, brown to brownish-black seeds with reticulate walls; lignified elements stained bright-red with phloroglucin; starch not found in ripe fruit. *Mexican Vanilla* has in connection with the elements of the fibro-vascular bundle, a characteristic netted-pored parenchyma cell, distinguishing it from the other vanillas. Vanilla distinguished from admixtures with *Tonka* by latter containing starch.

γ. *Crystals in raphides.*

364. *Vanilla.* See No. 363.

b Crystals in fine, sand-like particles.

365. *Cinchona.*—Contains small amount of starch. See No. 299.

366. *Quassia* (Jamaica).—See No. 358.

367. *Tobacco.*—Characteristic secreting and non-secreting hairs; sklerenchyma fibres; stomata characteristic.

(*To be continued.*)

GLEANINGS FROM THE MEDICAL JOURNALS.

By Clement B. Lowe, M.D.

THE REMOVAL OF WAX FROM THE EAR.

The *Indian Lancet* for June 16th, quoting the *Union Medicale du Canada* for January, states that Albert Ricci, of Turin, has ascertained that the solution of hydrogen dioxide possesses the peculiar quality of rapidly disintegrating the obstructive masses of cerumen in the ear. It suffices to pour into the *meatus auditorius externus* a *small* quantity of the solution, and leave it for a few moments in contact with the ceruminous plug. The latter is then most easily and safely removed by syringing with water, even though it were a hard concretion.

PRIZE FOR A METHOD FOR THE PURIFICATION OF DISTILLERY BY-PRODUCTS.

The North of Scotland malt distillers offer a prize of $10,000 for a successful method for the purification of waste products that polluted the streams of the North of Scotland until the Government interfered with the industry. The following is the offer open to chemists of the world: Distillery By-Products—The North of Scotland Malt Distillers' Association offer a premium of £2,000 sterling to any one devising and handing over to them for their sole use and behalf such a scheme for treating the by-products of distilleries, as will effectually purify them and be adopted by the Association. Samples of the by-products will be furnished and facilities given on application to the Secretary, D. Mustard. The by-products consist of:

(1) The spent-wash or "burnt ale" after distillation of the spirits. It usually has a specific gravity of about 1·004. It contains a sediment of exhausted yeast, fine particles of malt-dust, also mineral salts, acids, etc.

(2) The spent-lees from spirit-stills contain fusel oil, etc.

(3) The washings of fermenting vats, washing of casks from the cooperage.—*Philad. Med. Jour.*, July 2, 1898.

COBALT NITRATE IN CYANIDE POISONING.

The London correspondent of the *American Practitioner and News*, for June 1st, says that a chemist is stated to have found in cobalt nitrate an effective antidote for both hydrocyanic acid and cyanide poisoning. Successful in the first trial with animals, its application has been extended to some forty cases of poisoning among human beings, and proved successful.—*New York Med. Journal.*

RECENT LITERATURE RELATING TO PHARMACY.

SOLUBILITY OF IODINE AND BROMINE IN WATER.

F. Dietze (*Pharm. Zeit.*, 1898, p. 327) finds the solubility of iodine in water not to be 1 in 5,000, but, at ordinary temperatures, it is 1 in 3,500 to 3,750, and at 30° to be 1 in 2,200. For bromine the solubility is correct as given in the German Pharmacopœia, viz.: 1 in 30.

CAUCASIAN SARSAPARILLA.

In the South of Europe occurs a sarsaparilla called "Italian," which is yielded by *Smilax aspera*, and is used by the people as a medicine, though it does not contain any parallin. Ed. Lehmann calls attention (*Farmaz Westnik*, 1898, p. 1) to the Caucasian Sarsaparilla (the origin of which is *S. excelsa*), which somewhat resembles the American sarsaparilla, and may be employed as an efficient substitute. Chemically, it appears that the Caucasian sarsaparilla contains parallin, or at least a principle resembling the same.—*Chem. Zeit.*, 1898, p. 120.

CARDIOGYNE AFRICANA, BUREAU.

A new dyewood is recorded by A. Engler as being yielded by *Cardiogyne Africana* (N. O. Moraceæ) from the east coast of Africa. The thorny bush occurs in abundance. The outer portion of the bark is marked by deep, longitudinal fissures; the inner bark and the white splint wood are rich in a yellowish milk juice; the heart-wood (which may have a diameter over 10 centimeters) is heavy and more or less red-colored. Linen is dyed of a beautiful light yellow color by means of alum and the heart-wood, and the article is not affected by soap.—*Chem. Zeit.*, 1898, 120, from *Notizbl. bot. Gart. u. Mus.*, 1898, II, 54.

VANILLIN IN OATS.

According to Olivier de Rawton (*Compt. Rend.*, T. 127, p. 197) there occur three crystallizable principles in oats, one of which yields upon oxidation, vanillin. Olivier believes this to be the stimulating principle of oats, inasmuch as horses fed with oats deprived of the pericarp do not respond as those fed otherwise, and the black oats of Bretagne, which are the most highly prized, yield more vanillin. In Normandy, horse dealers feed their spirited horses on the rhizome of couch grass. According to Olivier it is to the vanillin that triticum owes its stimulating properties, although there is here another glucoside which, upon oxidation, yields an aldehyde having the odor of Rosa gallica.—*Pharm. Zeit.*, 1898, 304.

EDITORIAL.

NEW ELEMENTS.

History is not only being made rapidly during the closing days of this century, but science is being remarkably enriched by the discoveries of particularly the last few years. It is only a few years since that Lord Raleigh and Professor Ramsay announced the discovery of an unknown element in the atmosphere. In the course of their experiments upon nitrogen, they found that "atmospheric nitrogen" had a greater density than "chemical nitrogen," and that this was not due to the presence of an impurity, but to the existence of a new element, which they called "*argon*." This was subsequently examined by Professor Olszewski, and its melting and boiling-points and critical temperature determined.

A few months after the publication of this work Professor Ramsay, when studying the nature of gases obtained by heating minerals, obtained *argon* from some, but he also obtained from a mineral brought from Sweden, a light, colorless gas, that was lighter than argon, and gave a different spectrum, and in particular gave a brilliant D_3 line in the yellow. This line had heretofore been noticed in the solar spectrum, and thirty years ago was attributed by Lockyer and Frankland to a hypothetical element, which they called "*helium*." There are certain analogies between argon and helium. (See this JOURNAL, November, 1895.)

Professor Ramsay and Mr. Travers have recently (June, 1898) communicated to the Royal Society the discovery of an additional gas in the atmosphere. This is heavier than argon and less volatile than nitrogen, oxygen and argon, and has received the name "*krypton*" (hidden). These two chemists continued these investigations, and later announced the discovery of two more constituents of atmospheric air. They liquefied large volumes of argon, using liquid air as the cooling agent. When argon was passed into a bulb cooled by liquid air, it formed a liquid in which a white solid appeared. By evaporation of the liquid they obtained a gas which behaves in a vacuum tube entirely differently from other known gases, and to which they gave the name "*neon*" (new). From the solid they obtained a gas which was entirely different from argon, although resembling it in general character. It possesses a different spectrum from argon, behaves differently at low temperatures, and the authors conclude that it is elementary, and call it "*metargon*." It holds the same position towards argon that nickel does to cobalt, having approximately the same atomic weight but different properties. There appears some doubt among certain investigators as Professor Schuster and Professor Dewar regarding the presence of metargon in argon, although the presence of krypton and neon are fairly well established.

Professor Nasini, of Padua, has been making some studies on the gases emanating from the earth in various portions of Italy. In a communication to the French Academy in July, he announced the discovery of a gas which had not been found before on the earth. The gases from the Solfotara di Pozzuoli contained a gas corresponding to the undiscovered element *coronium*, the specific gravity of which is lighter than hydrogen.

Charles F. Brush, at the Boston meeting of the American Association for the Advancement of Science, reported on some experiments which he has been car-

rying on in eliminating a gas from the atmosphere that is lighter than hydrogen, which is named "*etherion.*" Its ability to conduct heat is 100 times as great as hydrogen, and it is probably not confined to the earth, but must reach out indefinitely into space.

Sir William Crookes, in his presidential address before the British Association for the Advancement of Science, communicated the results of the examination of some of the rare earths. "In the spectrum of a part of a specimen which had been isolated from the rest, he discovered lines that were unrecognizable. Eventually he found that he had discovered a new element, and he is now making investigations on it." Its atomic weight is 118. The characteristic lines of its spectrum are in the ultra-violet and stand alone, and from this latter circumstance has been called "*monium.*"

"The appearance of so many new elements at one time will no doubt prove embarrassing with the present arrangement of the Periodic System, and attempts will probably be made to rearrange the system to conform to these new discoveries. Professor Crookes has suggested an arrangement of the elements in the form of a double spiral, in which the elements are arranged in three dimensions in space, the three elements discovered by Ramsay falling in the vertical column under helium between the hydrogen family, containing chlorine, bromine and iodine, and the lithium family."

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

PHARMACEUTICAL AND MEDICAL CHEMISTRY. VOL. I. General Chemistry. By S. P. Sadtler, Ph.D., F.C.S., and H. Trimble, Ph.M. J. B. Lippincott Company. 1898.

The appearance of a new edition of this most excellent work will receive a hearty welcome, particularly so since the authors have divided the bulky and expensive one volume into two convenient parts, each covering a distinctive field, Volume I being devoted to Elementary Physics with Inorganic and Organic Chemistry, while Volume II, which has just appeared, takes up Qualitative and Quantitative Analysis, with Pharmaceutical Assaying.

The thoroughness of this well-known work, with the clearness with which the subject matter is treated, leaves but little to criticise except it be in the introductory chapters on Physics and General Chemistry.

When we consider the growing importance of the subject of Physics in its applications to the study of chemistry, pharmacy and medicine, one is naturally surprised to see the entire subject condensed to within a space of ninety-one pages. In the endeavor to keep the work within a reasonable size, much descriptive matter, with many illustrations, have been omitted, which are actually indispensable for a clear and proper understanding of the subject. Space might have been economized in omitting a number of large illustrations devoted to pure technical operations, as "The Lime Kiln," "Lead Furnace," "Sodium Furnace," "Silver Cupellation Furnace," etc. For example, the entire subject of electricity is covered in sixteen pages, with but six illustrations. Under this sixteen lines have been devoted to explaining the system of telegraphy, twenty to the telephone, with about the same number to the principles involved in electrical heating and lighting, the dynamo, X-rays, etc. It is an impossibility for a beginner to form a tangible idea of these subjects

without proper illustrations and plans, particularly so when the subject matter is condensed into the smallest possible space.

In the introductory chapter on Chemical Theory many explanations lack illustration in the way of formulæ and equations. For example, under the definitions of the terms "hypo," "per," "ous," "ic" salts, examples of well known compounds might have been cited under each; again in explaining the nomenclature of the different compounds of chlorin and oxygen, were the several formulæ appended, the student would more readily grasp their meaning and relationship. The subject of acid anhydrides is missed.

In the explanation of the rules of nomenclature of the acids and salts, comparative tables would materially assist in systematizing the subject. The subject of "Chemical Reactions and Equations" has suffered much from condensation, more space should be devoted to giving the beginner a clear understanding of the conditions governing chemical reactions, the influence of heat, light and electricity on chemical combination and decomposition, rules of solubility, etc. One page is scarcely sufficient to clear up the subject of stochiometry in the mind of the average student, owing to the many different ways in which the subject may be presented. It might have been well to have added questions with solution wherever possible under the "practical exercises."

In the writer's opinion it would be far better, if space is the primary consideration, to cut down descriptive matter elsewhere, but under no circumstances should the introductory chapter embracing the fundamental principles of chemical theory be abridged.

The arrangement and classification of the subject matter of the chapters on Inorganic and Organic Chemistry is very systematic and, therefore, a great aid to the student in classifying his knowledge. Argon and Helium have found place in the revised text.

The older distinctions between a luminous and non-luminous flame based on the presence of solid incandescent particles might stand revision in accordance with the results of more recent investigations upon this subject.

Since the appearance of the first edition in 1895, a number of synthetic medicinal products have come into general use, these present exceedingly interesting material from a chemical standpoint. For example, the organic and colloidal preparations of silver, the organo-therapeutic agents, iodoform substitutes, local anæsthetics, etc., none of these have received any attention.

We miss among the proximate plant principles, allusions to the important investigations of Kiliani, which have accomplished so much to clear up our knowledge of digitalis; the same might be said of the solanaceous alkaloids. A systematic table of color reactions for the identification of plant principles would be acceptable.

To the student, the index of his text or reference book is a very important feature, for, owing to his inexperience, he will seek his references in a very unsystematic manner, hence in view of this, the matter of synonyms and cross references should be well provided for. In this respect the index of the above work is deficient.

V. COBLENTZ.

A SHORT MANUAL OF ANALYTICAL CHEMISTRY, qualitative and quantitative, inorganic and organic. Following the course of instruction given in the laboratories of the South London School of Pharmacy. By John Muter, Ph.D.,

F.R.S.E., F.I.C., F.C.S., etc. Second American edition—illustrated. Adapted from the eighth British edition. Philadelphia: P. Blakiston, Son & Co. 1898. 8vo. Pp. xiii and 228.

The first American edition of this work was very favorably criticised at length in the October, 1891, number of this JOURNAL. The present edition has been made to correspond to the last revision of the United States Pharmacopœia. The book has also undergone some general revision. A few of the less important matters have been dismissed, but, by the addition of new matter, the book has been somewhat enlarged over the first edition. The important of these additions are in the sections devoted to the reactions of the alkaloids, to the qualitative detection of certain organic bodies commonly employed in medicine, to the analysis of fixed oils, fats, waxes, soap and essential oils; hence, the scope of the work has been extended. What was said seven years ago for the first edition is still applicable to the work, viz: "We regard the work as a very useful one, and as being well adapted for analytical work by students under supervision of an experienced teacher, and for a trustworthy guide to those who are uot novices in chemical analysis."

J. C. P.

ESSENTIALS OF MATERIA MEDICA, THERAPEUTICS AND PRESCRIPTION WRITING, arranged in the form of Questions and Answers. Prepared especially for students of medicine, by Henry Morris, M.D. Fifth edition. Price, $1 net. W. B. Saunders. Philadelphia. 1898.

The reviewer of this little book believes with the author "that the time has come in scientific medicine when an attempt at classification, however imperfect and tentative, should be made, instead of giving up the whole subject as hopeless and arranging the remedies in alphabetical order; and, consequently, finds in this compendium much to commend it to the student of medicine, provided it be kept in its proper place. While not written from the standpoint of the pharmaceutical student, it possesses several features that would render it useful to him as well. These features are the prominence given the official names of the drugs and preparations of the Pharmacopœia, the expression of doses in the metrical system of weights and measures, as well as in the older apothecaries' weight and wine measure, and the brief but lucid description of the physiological action of the drugs treated of, as well as their toxicological symptoms and antidotal treatment, this last being especially helpful to the pharmaceutical student. The young practitioner may also find in its pages many practical suggestions of value, both in therapeutic hints and prescription writing, especially as regards the incompatibilities, a subject that so frequently occasions the young physician so much annoyance. The adverse criticism the reviewer feels inclined to make is as to the arrangement of the subject-matter in the form of questions and answers, but as this criticism would apply to the whole series rather than to this book in particular, it does not militate against what has been said in its commendation.

J. L. D. M.

A TEXT-BOOK OF MATERIA MEDICA, THERAPEUTICS AND PHARMACOLOGY. By George Frank Butler, Ph.G., M.D. Second edition, revised. Philadelphia: W. B. Saunders, 925 Walnut Street, 1898. Cloth, $4.00; sheep, or half morocco, $5.00, net.

This work savors of the product of a man of considerable experience, and one who has asked and followed the counsel of maturer minds. The work has been written with the immediate object of supplying the student in medicine with a clear, concise and practical text-book, adapted for permanent reference no less than for the requirements of the class-room. It, however, has much in it to commend it to the pharmacist. There are no less than about eighty pages devoted to the consideration of "Weights and Measures" and "Pharmaceutical Preparations," which were written by Prof. C. S. N. Hallberg. We notice the substitution of a chapter on the "Untoward Effects of Drugs" for that on Definitions. This is an innovation which will commend itself to all, as a series of tables are also furnished which will enable one at a glance to secure the information desired.

Excellent well-digested chapters on Serum-therapy and Animal Extracts (organotherapy) will undoubtedly serve to enhance the value of the work. The drugs are considered according to their physiological action, but there is also incorporated under each drug its synonyms, origin, description and properties, preparations, dose, administration, therapeutics and physiological action. A chapter on Prescriptions and two rather comprehensive indices—(1) clinical and (2) general—complete the volume.

The second edition has been carefully revised, and will doubtless be even more favorably received and appreciated by medical teachers, students and physicians generally, as well as the busy pharmacist who needs a work of this kind for general reference at least.

KING'S AMERICAN DISPENSATORY. New edition. Entirely rewritten and enlarged. By Harvey W. Felter, M.D., and John Uri Lloyd, Ph.M. Two volume edition, royal octavo, each volume containing over 950 pp., with complete indexes. Cloth, $4.50 per volume post-paid. Sheep, $5 per volume post-paid. Volume I now ready. The Ohio Valley Company, Publishers, Cincinnati, O.

This new edition of King's American Dispensatory will be much appreciated by those who have been anxiously awaiting its appearance. The pharmacy and chemistry of the work have been rewritten by Professor Lloyd, and to Professor Felter has been assigned the entire medical section, as well as that portion embracing the botany, botanical history and botanical description. There are 115 illustrations in Vol. I, all of which, with very few exceptions, have been taken from various sources.

The work appears to have been brought up to date by the incorporation of the results of the more recent investigations, and will prove to be a useful adjunct to the reference library of the physician and pharmacist. We reserve, however, a more extended review of this work until Volume II appears.

MINUTE OF MEETING OF MEMBERS OF THE COLLEGE.

PHILADELPHIA, September 26, 1898.

The stated quarterly meeting of members of the College was held this day. Charles Bullock presided. The minute of the previous stated meeting was read and adopted. The minutes of the Board of Trustees of the previous meetings

were also read and approved. A report of the delegates to the sessions of the American Pharmaceutical Association, recently held in Baltimore, was made verbally by Mr. Boring. This was supplemented in a few words by Professor Remington, who referred to the fact of the presence at that meeting of a considerable number of the older druggists of the country. Allusion was also made to the prevailing sentiment that hereafter no person should be permitted to go before the examining Boards of Pharmacy who does not hold the diploma of an accredited college. Also that in reference to the trade conditions of the Retail Branch of Pharmacy the existent evils and errors should be remedied by united individual or associated action. The Secretary read a letter from Dr. F. Hoffman having reference to the loss sustained in the death of Henry Trimble. A memoir of Henry Trimble was read by Professor Remington, from the committee to whom the subject was referred. Which memoir was referred to the Committee on Publication of the JOURNAL, and reference to it ordered to be made upon this minute.

It is as follows :

Henry Trimble was born May 22, 1853, at Chester, Pa., and died August 24, 1898, at his home at St. Davids, Pa. He was a son of Stephen M. Trimble, and received his early education at the famous Westtown School, near West Chester. He began his apprenticeship in the drug business in 1872 with S. Mason McCollin, at the corner of Fifth and Callowhill Streets. He matriculated as a student at the Philadelphia College of Pharmacy in 1874, and developed a fondness for chemical research. He graduated with the Class of 1876, his thesis being "Benzoic Acid as an Antiseptic." Organic chemistry especially interested him, and, entering the University of Pennsylvania, he pursued his studies in this department of science. For a time he acted as an assistant to the Chair of Organic Chemistry. For five years, from May 28, 1878, he was in the retail drug business, associated as partner with C. W. Warrington. Professor Sadtler, in 1879, chose him as his assistant at the Philadelphia College of Pharmacy in his work in the chemical laboratory, and in 1883, Professor Trimble was given charge of this department. His fifteen years of faithful work in analytical chemistry greatly contributed to the success of the College.

Professor Trimble possessed an investigating mind, and, being a careful observer, he never failed to impress upon all students entrusted to his care the value of being absolutely certain of the underlying facts in any research in which they were engaged.

In chemical research his name will probably be associated for years to come with the *tannins*, and it is not too much to say that he made himself an authority upon this important group, having correspondents in all parts of the world on this subject. As an author, he will undoubtedly be best known by his "Handbook of Analytical Chemistry," first published in 1885, and afterward merged into the now well-known "Text-Book of Chemistry," by Sadtler and Trimble, a new edition having just been published.

In College affairs, in addition to his teaching duties, we find him, as always, faithful, painstaking and industrious.

In 1877 he was elected a member of this College, and in the same year he was elected a member of the Executive Board of the Alumni Association, and has been a member of both ever since. He was made Vice-President of the Alumni Association in 1880, and in 1881, President of the same body. He was

elected a member of the Board of Trustees of the College in 1884, and served in this capacity fourteen years.

Upon the death of Professor Maisch in 1883, he was elected Editor of the AMERICAN JOURNAL OF PHARMACY, and his contribution of papers to this JOURNAL number thirty-six, and five papers associated with other writers. In addition to this, Professor Trimble wrote many book reviews and editorials. As a writer he was clear, forcible and convincing. He was indefatigable in inducing others to attend the pharmaceutical meetings of the College, and in securing papers and in fostering an interest among the students in recording and writing up the results of their work to add to the value of these meetings; afterward these contributions were usually found in the pages of the AMERICAN JOURNAL OF PHARMACY.

The labors of Professor Trimble were not confined to College and editorial work. He found time to contribute papers upon botanical subjects to various journals, and to the American and Pennsylvania Pharmaceutical Associations he was well known as a contributor of papers, and an active worker on committees.

He lectured upon chemical subjects one winter at the Franklin Institute, and was elected a member of the American Philosophical Society, in 1897. He was also a member of the American Chemical Society, of the London Society of Chemical Industries, of the London Chemical Society, and the Deutsche Chemische Gesellschaft.

By the death of Professor Trimble pharmacy has suffered a great loss. A consistent member of the Society of Friends, through inheritance and education, he possessed the valuable traits of the typical Friend. Always opposed to ostentation, he quietly pursued the path which he believed to be the one marked out for him. His opinions always commanded respect, and those who knew him intimately enjoyed the keen sense of humor with which he was gifted. His integrity was unquestioned, his character beyond reproach. While science has lost a faithful investigator, the College a devoted worker, he leaves to his wife and children a sweet memory of a devoted, loving father.

WM. B. THOMPSON,
Secretary.

MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, October 18, 1898.

The series of Pharmaceutical Meetings for 1898–99 was inaugurated on Tuesday, October 18, at 3 P.M., in the Museum of the College.

The audience was a representative one, and it is hoped that the interest manifested at this first meeting may be continued throughout the series.

The chairman of the committee having charge of these meetings, Prof. Henry Kraemer, made some introductory remarks, first of a general character, and then he alluded to the work of the former chairman of the committee, the late Professor Trimble, in his untiring devotion to the cause of pharmaceutical progress. He thought that the example furnished by the life and work of Professor Trimble should be an inspiration to those present not only to do as well as he did, but to do even better if possible.

Dr. C. B. Lowe having been asked to take the chair, the consideration of

papers was begun. Prof. Joseph P. Remington having continued his experiments with acetic acid as a menstruum and solvent, presented a paper entitled "Fluid Acetracts" (see page 543). The subject is one fraught with interest not only from the pharmaceutical standpoint, but is of commercial importance as well, and aroused considerable discussion.

In reply to a question by F. X. Moerk, as to the keeping qualities of fluid acetracts, Professor Remington said that this series of preparations required as much individuality and study on the part of those engaged in their manufacture, as the alcoholic preparations required to bring them up to their present standard of efficiency. Hot weather does not appear to affect their stability, some of the samples having been kept for five years. For some preparations, a 10 per cent. acetic acid menstruum was found to be too weak. Others participating in the discussion of the paper were Thos. S. Wiegand, Wallace Procter, F. W. Haussmann and the chairman.

F. W. Haussmann presented a contribution on "The Inversion of Cane Sugar in Official Syrups," which will be published in a subsequent issue of this JOURNAL. The results obtained by the author showed that free mineral acids have a pronounced influence in inverting the cane sugar present in syrups, and indirectly in causing the change of color so often noticed in these preparations. Free organic acids also cause the formation of sugars having a reducing action on Fehling's solution. Furthermore, it was observed that syrups which contain no free acid do not show the presence of more than small amounts of reduccing sugars either in freshly made samples or in those which have been kept for some time.

Several practical points were brought out in the discussion of this paper. Remarking upon the question of gastric irritation caused by the administration of syrups, Professor Remington did not think it likely that the small amount of laevulose present would cause the trouble, but that it was probably due to other constituents. Continuing his remarks, he said that recent investigations in regard to the effects of glucose on the animal economy had confirmed the view that it is far more wholesome than saccharose as an article of food, and that there is evidence of its growing in favor in this respect.

Dr. C. A. Weidemann said that he had suffered considerable loss from the darkening of syrups, and suggested the use of rock candy in their preparation, which he had found to be more successful.

Mr. Haussmann maintained, however, that the prevention of change of color was impossible unless something other than sugar was used. Syrups made with glycerin and saccharose did not deposit, but became darker. He said that the only remedy was a cool temperature.

The following members also took part in the discussion: Professor Moerk, Messrs. England, La Wall, Procter, Boring and the chairman.

An interesting part of the program was that devoted to an expression of opinion concerning the Baltimore meeting of the American Pharmaceutical Association. The speakers all expressed themselves as having very much enjoyed the hospitality of the pharmacists of Baltimore and the social features of the meeting. The work accomplished by the several sections of the Association was also spoken of in high terms and as giving evidence of progress along their respective lines.

An exhibition of botanical and drug specimens next occupied the attention

of the meeting. These included a growing plant of Barbadoes Aloes together with a sample of the drug of this plant, and a sample of the bean of Entada scandens, sent by Prof. J. U. Lloyd; samples of powdered drugs and spices from Gilpin, Langdon & Co.; specimens of some of the newer botanical drugs, such as Blood-flower, *Asclepias curassavica*, Lin., *Embelia ribes*, Burm., Hysterionica, *Haplopappus Baylahuen*, Remy, Horse-nettle berries and root, *Solanum carolinense*, Lin., Mountain Sage *Sierra Salvia*, *Artemisia frigida*, *Willd.*, Muirapuama, *Newbouldia laevis*, Seem., *Orthosiphon stamineus*, Benth. (Java Tea), Saw Palmetto, *Serenoa serrulata*, Benth. and Hook. from Parke, Davis & Co. Samples of both "wirey" and "fancy" Ipecac and one of German ergot from Richard Shoemaker; a sample of "Quebracho gum" which chemically, closely resembles kino, and a specimen of "Gogo," a Philippine Island drug (already referred to in the September number of this JOURNAL, page 480), from E. H. Gane, now of New York; a specimen of the fruit of a species of Martynia produced by a plant grown in Camden, N. J., and described by F. X. Moerk; and a specimen of the flower and leaf of a hardy Datura brought from Ridley Park, near this city, by Miss C. J. Taylor.

On motion, the meeting adjourned.

THOS. S. WIEGAND,
Registrar.

Fehling's Solution for Urine Analysis.—J. B. Tingle (*Amer. Chem. Jour.*, 1898, p. 126) recommends the Pary solution modified by Purdy, in which the tartrate is replaced by glycerol. The composition is given of the solution which is especially designed for urine analysis.

Coloring Principle of Uva Ursi.—According to A. G. Perkin (*Chem. News*, 1898, p. 208) there is present in the leaves of *Arctostaphylos uva ursi* a yellow coloring principle of the composition, $C_{15}H_{10}O_7$, crystallizing in glistening yellow needles; this forms an acetyl compound, $C_{13}H_5O_7Ac_5$, melting at 188°–190°. On fusion with alkali, phloroglucinol and protocatechuic acid were formed. Though resembling quercetin in these points, it has the property of forming deep green solutions with dilute potassium hydrate. Oxidation in alkaline solution did not destroy the green coloration until complete decomposition of the coloring matter had taken place. The presence of ellagic acid has also been detected, and thus besides gallotannin, ellagitannin is also present. Broach leaves contain the same coloring matter.

A Fish Poison.—The natives of Surinam, according to Pool (*Pharm. Centralh.*, 1898, p. 282), whip the water with the wood of a tree, *Lonchocarpus violaceus Bth.*, N. O. Leguminoseæ. The wood is called by the natives "Nekoe," and by the Europeans, "Stinkwood." It has a disagreeable odor, and is supposed to contain a substance possessing a narcotic action on fish.

THE AMERICAN

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DECEMBER, 1898.

THE INVERSION OF CANE SUGAR IN OFFICIAL SYRUPS.

By F. W. Haussmann.

The subject, which the writer would bring before the meeting, may be regarded as a preliminary paper to some work on syrups at present under way. At one of the meetings of the Pharmacopœial Research Committee of the P.C.P. last winter, a few observations pertaining thereto were related to the late Prof. Henry Trimble, and on his suggestion closer inquiry was made into a subject, regarded then as of little importance.

Syrup of hydriodic acid was the first preparation in which large quantities of a sugar reducing Fehling's solution were noticed.

Further investigation revealed, however, that the changes to be described were not confined to this syrup, but that others, containing strong mineral acids, showed the same conditions on prolonged standing.

The researches were consequently extended and other syrups, which developed marked color changes or heavy deposits without any apparent cause, were also examined. Such were syrup of calcium lactophosphate and syrup of the phosphates of iron, quinine and strychnine.

The syrups mentioned change in color, gradually turning anywhere from a straw color to brown, which in the case of syrup of hydriodic acid is usually attributed to the liberation of free iodine.

Such is, however, not the case.

In an examination of a number of specimens of this syrup, which

varied in color from light straw to deep brown, and in age from six months to two or even three years, not one was found to give a free iodine reaction.

Similar conditions prevail in the other two syrups mentioned.

The writer would offer the following explanation of this color change:

The free acid will invert the cane sugar in the syrup, with formation of glucose and laevulose.

The latter, according to Jungfleisch and Grimbart, decomposes much more readily than glucose, a pure solution turning yellow at 40° C.

Prolonged action of mineral acids also decomposes laevulose, with formation of formic and laevulinic acids, together with the indefinite coloring compounds, which the Germans describe under the title of "humin substancen."

That high temperatures have a certain influence on the production of these color changes, was illustrated during the hot days of the past summer.

Samples of syrups of hydriodic acid and calcium lactophosphate, which remained colorless through spring and early summer, in July and August almost simultaneously became straw colored to brown.

Syrups, thus inverted, will gradually deposit grape sugar. This takes place more readily in winter, as the higher summer temperatures will keep the glucose in solution.

The writer found this to be the case with syrups of hydriodic acid, calcium lactophosphate and syrup of the hypophosphites prepared according to Churchill's formula.

The deposit in a specimen of syrup of hydriodic acid, after being washed with small portions of water and alcohol to remove the acid, was dissolved in boiling alcohol, filtered while hot and allowed to redeposit.

The white warty mass thus obtained has a feebly sweet taste, is readily soiuble in water and strongly reduces Fehling's solution.

It responds to all other reactions for grape sugar, and estimated with the alkaline cupric tartrate V. S. gave an anhydrous glucose percentage of over 75.

In the proceedings of the A. Ph. A. of 1893, some observations of Kulisch are recorded on the inversion of beet root sugar in the presence of natural fruit acids.

He also finds grape sugar to deposit from such syrups on standing and attributes it to the minor solubility of glucose in water.

Another result of cane sugar inversion in acid syrups is the diminished degree of sweetness.

In preparations containing no bitter principles this is readily noticeable and may be found in syrups of hydriodic acid and of Churchill's hypophosphites.

After examination of the official syrups containing free mineral acids, those with *organic* acids were likewise subjected to investigation and also gave indication of the inversion of the cane sugar although not in as pronounced a degree.

In both cases it was found that inversion is progressive and that at short intervals the respective examinations revealed a relatively greater amount of inverted sugar from the percentage previously found.

It was also observed that inversion progresses more rapidly in summer than winter.

The researches undertaken may be considered under the following heads:

(1) Syrups with free mineral acids.
(2) Syrups with free organic acids.
(3) Syrups without free acids.

SYRUPS WITH FREE MINERAL ACIDS.

These are syrups of hydriodic acid, calcium lactophosphate, phosphates of iron, quinine and strychnine, and hypophosphites.

SYRUP OF HYDRIODIC ACID.

This preparation may be found in time to possess all the peculiarities resulting from cane sugar inversion from the assumption of a straw color to a grape sugar deposit. The peculiar odor sometimes noticeable may, on the one hand, be due to the decomposition of the hypophosphorous acid present, but results in the majority of cases from the evolution of hydrogen sulphide from blued sugar.

The progressive inversion of cane sugar in this preparation was repeatedly studied, and the following examples, one carried out during winter, the other in summer, are hereby submitted.

Syrup of hydriodic acid was prepared in March of the present year by the official process from simple syrup prepared by cold per-

colation from carefully selected granulated sugar and distilled water.

The latter was examined with Fehling's solution as to the amount of inverted sugar and was found to contain between ·33 and 0·5 per cent.

Immediately after completion the syrup of hydriodic acid was examined and no increase in the inverted sugar percentage found.

After standing twenty-four hours a noticeable increase was shown, which, on estimation, proved to be 15·1 per cent.

Two weeks after preparation the percentage found was 62·5 calculated as glucose.

After standing for over six months with exposure to summer heat, the syrup became straw colored, contained no free iodine, and revealed almost the identical inverted sugar percentage of the previous examination.

During the warm days of August of this year a number of specimens of the syrup were prepared.

The following example is selected from these:

The syrup was prepared by agitation without heat, the sugar being dissolved in an aqueous solution of hydriodic acid, showing after one hour's standing, 1·5 per cent. of inverted sugar.

Forty hours afterward it was found to contain 43·8 per cent.

A subsequent examination, when the syrup was five days old, showed 62 per cent., and after one month approximately the same percentage was found.

A tally was kept on this preparation with a specimen of syrup also prepared by agitation containing 10 per cent. by weight of glycerin.

This was done to determine if the presence of glycerin retarded the inversion of the cane sugar.

Such was found not to be the case, the inversion also being progressive, eventually showing almost the same percentage of glucose as in the corresponding sample.

A number of specimens of the syrup prepared by the writer and obtained from other sources were also examined.

The following table furnishes the record of the *colored* syrups as to age and percentage of inverted sugar.

	Color.	Age as Far as Known.	Per Cent. of Inverted Sugar Calculated as Glucose.	
1.	Straw	9 months.	58·4	No free iodine in any of these specimens.
2.	Brown	2½ years.	50·	
3.	Straw	10 months.	59·5	
4.	Brown	2 years.	58·1	
5.	Straw	6 months.	61·7	
6.	Brown	20 months.	55·4	

SYRUP OF CALCIUM LACTOPHOSPHATE.

This preparation shows changes similar to syrup of hydriodic acid, gradually becoming straw colored, which may deepen to brown on prolonged standing, and not infrequently grape sugar deposits may be found.

The gradual inversion of the saccharose was observed in a syrup prepared in midwinter, the change being, due to the low temperature, somewhat slow.

The syrup was prepared according to official directions, four to five hours being required for completion.

Immediate examination gave evidence of but a slight amount of inverted sugar, which was not materially increased during twenty-four hours.

After three days, however, 2·8 per cent. was found, after one week, the syrup still being kept at a low temperature, the figure was 4·9 per cent., which was increased after sixteen days to 12·7 per cent. Gradual increases were found at various intervals during the following fifteen days, and after one month's standing 20·0 per cent. were found.

During the following six months the syrup retained its original colorless condition, until the heat of summer caused it to assume a straw color, which gradually deepened.

Examined after standing eight months, the syrup showed an inverted sugar percentage of 54·9.

Another specimen, prepared fourteen days afterwards, examined

at intervals, also showed progressive inversion, passes through the same color changes, and after eight months contains 56·8 per cent. of inverted sugar.

A brown, commercial sample of the syrup, about one year old, showed a percentage of 49.

SYRUP OF THE PHOSPHATES OF IRON, QUININE AND STRYCHNINE.

The difficulty of preserving Eaton's syrup is well known, various reasons having been advanced for the discoloration and precipitation taking place.

The chief criticisms have come from British sources and several recommendations for improvement, such as decrease in the amount of sugar and free acid, have been made.

In a subsequent paper, the writer will render his experience with this preparation.

At present he would state, that he believes the discoloration to be chiefly due to the inversion of the cane sugar with formation of brown side products, induced by the phosphoric acid.

The inversion of the cane sugar was also found to be progressive in the following instances:

The syrup was prepared according to official directions, employing simple syrup showing 0·33 per cent. of inverted sugar.

Seven hours after completion this was found to have increased to 1·95 per cent. and the increase was continued during three months, at the expiration of which the percentage found was 50.

This syrup was kept during the summer in filled, amber bottles, away from light, but subjected to heat, and an examination in early fall found it to be dark brown and containing approximately the same inverted sugar percentage.

Simultaneously with the foregoing Eaton's syrup was prepared by a modification of the official methods, in which sugar was directly employed and dissolved by agitation in the acid alkaloidal solution.

Four days after preparation the percentage found was 19·2, while when twenty days old the syrup contained 43 per cent. On four months' standing the syrup contained 56·8 per cent., and three months later, the now brown syrup showed a slight reduction from the last figure.

Other syrups examined were found to contain 54·9 and 56·4 per

cent. of inverted sugar after standing two months with exposure to summer heat.

A dark brown specimen, about ten months old, was found to contain 50·4 per cent.

SYRUP OF THE HYPOPHOSPHITES.

This preparation, as prepared by the pharmacopœial method, hardly deserves to be called syrup, containing only 50 per cent. cane sugar.

Singularly enough this official acid syrup differed from the others so far examined by showing no signs of color change.

A specimen of the syrup, contained in a partly filled bottle and exposed to every condition of temperature during eighteen months, still retains its original colorless appearance while giving evidence of decomposition otherwise.

This is probably due to the small percentage of free acid in the syrup.

With the well-known Churchill's syrup of the hypophosphites, which contains a larger quantity of free acid, the case is different, the writer having found this preparation to turn to a decided straw color, with a final deposit of grape sugar in cold weather.

Examination as to the amount of inverted sugar in the official syrup gave the oilowing results:

A sample six months old contained 20·8 per cent., while one of about eighteen months showed 29 per cent.

Progressive inversion was not studied in the official syrup.

It was, however, recently undertaken in Churchill's syrup, prepared by cold percolation.

The first portions of the syrup, dropping from the percolator, responded but feebly to Fehling's solution.

A contact of eighteen hours, however, revealed an inverted sugar percentage of 2·, while when forty-eight hours old the syrup was found to contain 3 per cent.

On standing four days, the percentage was found to be increased to 7·8 per cent., and in ten days to 18·1 per cent.

Recent examination, seventeen days after preparation, showed 27·7 per cent.

Other specimens of Churchill's syrup examined gave the following figures:

A slightly straw-colored syrup contained 56·4 per cent.; an old brown-yellow specimen, 62·3 per cent., and a straw-colored specimen, six months old, 58·2 per cent. of inverted sugar.

The salts of hypophosphorous acid have no reducing action upon Fehling's solution.

SYRUPS CONTAINING FREE ORGANIC ACIDS.

Organic acids also have the power of inverting saccharose, although not in as pronounced a degree as mineral acids.

The results, so far as decomposition or color changes, such as precipitation of grape sugar or darkening of syrups, are concerned, do not appear as prominently.

The experiments of Kulisch, mentioned before, indicate that heat and the *amount of free acid* are important factors in the course of inversion.

The latter view is substantiated by the results of the writer, but with the possible exception of the rapidity with which inversion takes place, a considerable increase in temperature is not necessary.

Prolonged contact of an organic acid with a cane-sugar solution will invert the saccharose at a temperature of 60° to 70° F.

This was found to be the case with syrup of citric acid.

The official syrups examined of the organic acid group were the following:

Syrup of citric acid, squill, ipecacuanha and acacia.

Syrup of garlic, being deeply colored, was not investigated.

SYRUP OF CITRIC ACID.

The phenomena of inversion of cane sugar in syrups with free organic acids were first observed in this preparation. Due to the absence of color, therefore permitting an accurate examination with Fehling's solution, it is particularly convenient.

The observations on the following specimen cover a period of eleven months:

Syrup of citric acid was made according to official directions, the simple syrup used in its preparation having but feeble reducing action.

After standing twenty-four hours, signs of the presence of inverted sugar made their appearance.

After standing forty-five days, it was found to be 22·7 per cent., and after three months, between 40 and 41 per cent.

The four-months old syrup showed the percentage to be increased to 49·2 per cent., and ten to eleven months after preparation the figure was 63·1 per cent.

This would indicate that almost all of the sugar was inverted.

Outside of a slightly terebinthinate odor, the syrup at this time shows no change.

SYRUP OF SQUILL.

A number of specimens of this syrup were examined, one being kept under observation for a period of seven months.

Heat is employed in the preparation of the syrup, and a more rapid inversion may therefore be expected.

The above-mentioned sample, one week after preparation, contained 6 per cent. of inverted sugar.

At various intervals examination showed constant increases, and after seven months 26·1 per cent. was found.

Other specimens showed, respectively, 12·5, 11 and 11·2 per cent., but none are as old as the above syrup.

SYRUP OF IPECACUANHA.

Syrup of ipecacuanha, containing but a small amount of free acid, shows the smallest inverted sugar percentage of all syrups examined.

Being prepared by cold solution, it does not show a favorable condition for inversion.

A specimen, under observation for three months, shows a percentage of 2·1, while the highest found in any sample was 3·7 per cent. Another syrup, of unknown age, showed 1·66 per cent.

SYRUP OF ACACIA.

This syrup gives evidence of the presence of inverted sugar on standing, or at least of a compound reducing Fehling's solution.

The question may be raised, if this reducing action is not an inherent property of acacia and its solution.

The Pharmacopœia states that the latter has no reducing action upon Fehling's solution.

This has not been the writer's experience with mucilage from either solid, granular or powdered commercial gums. Other glu-

cose tests, such as the alkaline bismuth and safranin tests, also react, the picric acid reaction being an exception.

Samples of syrups of acacia, prepared as follows, have these percentages:

No. 1, U.S.P. syrup, nearly four months old, examined in 1 per cent. solution by volume, showed 4 per cent. inverted sugar.

No. 2, a sample prepared from granulated gum, heat being employed in its preparation, contained 3·5 per cent. of inverted sugar in 100 c.c. of syrup after standing three months.

No. 3, a syrup prepared from powdered gum showed 4·5 per cent. in 100 c.c. after four months.

The sugar and syrup used in these preparations gave but a feeble reaction with Fehling's solution.

NON-ACID SYRUPS.

Examination of this group was undertaken to determine the question, if syrups, containing no free acids and standing the same length of time as acid syrups, may not eventually also show the presence of considerable amounts of inverted sugar. Various circumstances necessarily occurring during the preparation and keeping of such syrups, as the influence of direct or summer heat, or fermentation, render such a condition possible.

But while some do undoubtedly contain small amounts of inverted sugar, in no case was the percentage found as large as in the acid syrups of either group.

Even in comparison with the weakest of the latter, syrup of ipecacuanha, none was found to even approximately reach its percentage of inverted sugar.

The following groups were examined, several specimens of each in a number of instances.

Syrup of althæa. The syrup, prepared by a method in which the mucilage was removed, possessed, after five months, practically no reducing action upon Fehling's solution.

Examination of several specimens, prepared by other methods, gave similar results.

Syrup of senega, several months old, examined in diluted form, showed an almost complete absence of inverted sugar.

In examining this syrup in diluted form with Fehling's solution,

the blue color of the latter is turned green, but even on prolonged boiling only a slight precipitate of cuprous oxide is found.

Syrup of lactucarium was also examined in the above manner with the identical results.

Syrup of orange peel, U.S.P., showed, on standing six months, a percentage of only ·33 per cent. of inverted sugar, and a specimen prepared from spirit of orange showed, one month after preparation, but a feeble reducing power.

After six months, no material increase was noticeable.

Syrup of tolu was examined repeatedly, the percentage in all cases being low.

One sample showed ·4 per cent. on standing three months.

In simple syrup the highest inverted sugar percentage found was ·45 in a three-months old specimen, prepared by cold percolation.

The statement that continued boiling will invert the cane sugar in simple syrup, the writer has been unable to verify, unless free acid was present.

The following deductions may be briefly considered:

By the presence of directly fermentable sugars in acid syrups, a favorable condition for the liability of rapid fermentation must be taken into consideration by the pharmacist.

Such syrups, therefore require special attention concerning preservation.

The physician is confronted by an analogous difficulty, namely, the likelihood of rapid decomposition in the stomach with consequent gastric disturbance.

An objection to syrup of hydriodic acid, made by a physician, was the above complaint, and was attributed at the time to the liberation of iodine.

The above results, however, convince the writer that inverted sugar was the disturbing factor.

In plant chemistry a field for speculation is opened by the question: What influence have organic acids in the formation of the glucose regarded as a normal plant constituent?

Phosphorus Manufacture.—Phosphorus is now produced (*Scient. Amer.*, October 8, 1898) by means of the electrical furnace. The method consists in heating a mixture of phosphate of lime and coke, which are first reduced to a powder. When the mass becomes pasty, the openings of the furnace are sealed except one, through which the vapor passes. The vapor is collected and distilled.

PRODUCT PATENTS FROM A PHARMACEUTICAL STANDPOINT.

By William L. Cliffe, Ph.G.

"The Congress shall have power . . . to promote the progress of science and the useful arts by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries."—Constitution of the United States, Art. I, Sec. 8.

Acting under this constitutional mandate, the Congress of the United States enacted a statute in 1790, providing for the granting of patents upon things described as an "art, manufacture, engine, machine or device, or any improvement thereon."

From this as a nucleus was evolved a model of legislative brevity which is the fundamental law covering the granting of patents at the present time, and which was in force during the time most of the chemical product patents which it is the purpose of this paper to discuss were obtained. (Section 4,886, Revised Statutes, U. S.)

This statute, in force, provides for the granting of patents upon four classes of inventions, named therein as an *Art, Machine, Manufacture and composition of matter.* These are really increased to eight classes, as pointed out by Hon. Benjamin Butterworth, Commissioner of Patents (1884, 30 Official Gazette, 1,321), by the additional "for any new or useful improvement thereon."

From a chemical and pharmaceutical standpoint, under this law, there can be two classes of patents granted; one for an art, which is commonly described as a process patent; and another kind for a composition of matter, generally referred to as a product patent.

To the chemist seeking as a patentee a monopoly upon the results of his inventive skill, it is clearly a matter of self-interest to secure a product patent whenever he can do so by claiming invention of the product of a chemical process.

The reason for this is obvious: granting a patent upon the end product of a chemical process effectively bars all possibility of competition with other inventors working in the same field.

It seems clear to the mind of a layman that this restriction of improvement is clearly in opposition to a fundamental provision of patent legislation as expressed in the statute, to wit, "for any new and useful improvement thereon."

Decisions by courts of last resort are not wanting in which this opinion seems to be sustained. Frequently have the claims of patents been rejected and stricken out on account of being broad enough to kill all competitive exercise of the inventive faculty during the life of the patent.

A notable instance being the Morse Telegraph Patent; the eighth claim of this patent was construed by the Supreme Court to be for the use of the electric current for making intelligible signs at any distance. The Supreme Court held this claim to be void. (O'Reilly *v.* Morse, 15 Howard, 112, 1853.)

This patent, if granted, would have covered the use of a principle and shut out from all competitors the use of the electric current for telegraphic purposes; "any new and useful improvement" over Morse's invention could not have been utilized. In clear distinction to this in the line of chemical patents, stands the process patent or a patent for an art (in a patent law sense); in granting which, of course, the proof of exercise of the inventive faculty is and should be demanded. Pettit (law of inventions, 1895) defines process in its patent law sense in the following terms: "A process may be said to be a directing or training of a force in a given manner through the medium of physical agents applied to material objects, whereby are produced material effects."

Probably one of the best illustrations of a chemical process patent was that granted to Richard Tilghman, of Philadelphia, for the manufacture of glycerine by the action of super-heated steam upon fats.

The claim of this patent was for "the manufacture of fat acids and glycerine from fatty bodies by the *action of water at a high temperature* and *pressure*."

Had Tilghman been able to claim the invention of the product, glycerine (discovered by Chevreul in 1813), he would never have been called upon to defend his patent by suing Proctor for infringement, because no matter what improvements Proctor did or hoped to make, would be shut out by the stone wall of an end product patent, during its term. To illustrate the advantages enjoyed by the chemical patentee who is lucky enough to secure a product patent over his confrère who invents a machine, the following is a good illustration. A patent was granted upon a machine for sawing shingles; another was granted for an improvement consisting of the

identical machine with a circular saw substituted for a perpendicular reciprocating saw. This patent for improvement was granted to the original inventor, but the logic of the law would require the grant to any other inventor. (Earl *vs.* Sawyer, 4th Mason 1, 1825.)

With this summing up of the legal aspects of product patents, it would be well to proceed to the consideration of the

COMMERCIAL ASPECTS.

Clear up to the early '80's, very little advantage was taken of the liberal provisions of our patent laws, but about this time, enterprising chemists in Germany (our laws permit foreigners to take out patents) saw the possibilities of the situation in the United States. After a few tentative patents, the ventures proved profitable beyond the clear calculations of commercial prescience. At the present time, there are no reports from the patent office which do not include numerous examples of this class of patents granted to German inventors. These patents are generally assigned to trustees in this country for the purpose of protection against infringement and of managing the business of selling. In almost every instance, the product is made abroad, bringing to this country nothing but the ad valorem tariff duty on their *actual value* as commercial commodities. The prices at which they are sold here are clearly indicative of a greed and rapacity which seem to be unrivalled in any other form of commercial monopoly. Taking, for instance, the case of phenacetin; it is probable that the outside approximate cost of this article, landed in this country, duty paid and put up in 1-ounce packages, is 10 cents per ounce; the selling price to the trade is $1 per ounce. To get an accurate idea of what had been wrested from the people of these United States upon this one article, the writer appealed to the Bureau of Statistics of the Treasury Department, but received the information that prior to 1895 there are no records of any importation of phenacetin, as such, and since that time only a few thousand ounces have been imported; these being various lots that were imported by others than the accredited agents of the trustee in claimed infringement upon the rights of the patent. The chemical and pharmaceutical trade in this country hold to the opinion that an estimate of 300,000 ounces a year for the term of the patent is conservative. Deducting the cost and jobber's commission would leave about 75

cents per ounce, amounting in this case to $2,025,000. Think of this from one product alone! In the case of others, which did not present the possibilities of such extended use as phenacetin, the ratio of percentage profit was increased, sometimes trebled or quadrupled.

Antipyrin was never as popular as phenacetin, but it is probable that nearly as much profit was obtained from the monopoly during its life, as it sold for $1.35 per ounce.

This then, is a condition of affairs here, but how different in Germany! There, the financial increment has built up numerous finely equipped laboratories, with scores of trained chemists and investigators, whose sole duty to the companies in control is to *find some new and useful composition of matter to patent in the United States.* Germany, undoubtedly scented the possibilities of the chemical product patent monopoly first, and having the finest laboratories of instruction at that time, has greatly increased her advantages and organized facilities through the aid of dollars stamped U. S.

It might be asked "What were our own chemists doing in not taking advantage of a condition of affairs which was presumably created for their benefit?" The question is capable of an answer which proves them the victims of ulterior conditions, but for the purpose of this discussion, it would be too lengthy to consider at this time.

There is still another side to this question, namely, its ethical one, which has always been a prominent factor in any question in which medicine and pharmacy has been involved. This factor has been ably handled in editorials in the *Bulletin of Pharmacy, Alumni Report, P.C.P., Paint Oil and Drug Reporter*, and other drug journals.

Note.—The legal authorities used and quoted are Robinson on Patents, Vol. I; Walker on Patents, third edition, 1895; Pettit, Law of invention, 1895.

Heat and Diarrhœa.—Cohn (*Arch. f. Kinderheilk.*) has studied the milk, the bottles, and the artificial food of a number of infants during several years, and finds that even where the food is in good condition and unchanged, as in breast-fed babies, the heat of summer may disturb the digestion of infants in some unknown way, and this must be considered as a factor in the etiology of diarrhœa in artificially fed children during the summer months.—*Pediatrics*, 1898, 919; from *Am. Jour. Obstet.*

MEDICINAL LITHIUM CARBONATE.

By Lyman F. Kebler.

Research Committee E, Pharmacopœia Revision.

Before considering the properties of lithium carbonate it might be well to briefly review its sources and methods of manufacture. Lithium, although widely diffused in small quantities, is found available for economical extraction in only a few localities. The minerals containing it most abundantly are the bisilicates of *petalite* and *spodumene*, the unisilicate *lepidolite* and the phosphates of *triphilite*, *amblygonite* and *lithiophilite*.

Lepidolite is (or probably better, has been) the source of much lithium carbonate, which is extracted by E. Schering's[1] process as follows: The finely-ground lepidolite is mixed with warm sulphuric acid to the consistence of a thin paste, which is then heated and stirred until agglomeration results. The resulting lumps are then calcined in a reverberatory furnace, cooled, and while yet warm are lixiviated with water. From this solution most of the aluminum is removed as potassium alum and the bases are farther removed by means of milk of lime. The remaining bases are converted into chlorides by precipitation with a solution of barium chloride, and the clear solution evaporated to dryness. The dry residue is next digested with absolute alcohol, which removes lithium and calcium chlorides. The alcohol is distilled off, the residue taken up with water and the calcium removed as an oxalate. The small amount of foreign metals still present is removed by treating the filtrate with ammonia and ammonium sulphide. The filtrate is now evaporated to dryness, the pure lithium chloride taken up with a suitable quantity of water and converted into the carbonate by adding the proper quantity of a concentrated solution of ammonium carbonate. The lithium carbonate is finally collected, washed with 60 per cent. alcohol and dried.

A. Schrötter's[2] method, for similar minerals, is probably the best commercially, but does not give as pure an article. By this method the minerals are fused at a red heat and while molten are ladled out into water. When cold, the mass is powdered, mixed with a suitable quantity of water and treated with hydrochloric acid (sp. gr. 1·2). After standing twenty-four hours the whole is heated to nearly boiling, and in a few hours most of the silica will be separated. The iron is then oxidized with a little nitric acid and most of

the bases, except alkalies, precipitated by carefully adding a solution of sodium carbonate to the boiling, moderately dilute liquid. The precipitate is removed by filtration or otherwise, and the filtrate concentrated to remove a small amount of foreign carbonates still present. The lithium chloride solution is finally concentrated, the lithium carbonate precipitated by means of a solution of sodium carbonate, collected, washed and dried.

M. H. Müller[3] devised a method for working the phosphates, some years ago, and the same process is, probably, in use at present. The powdered mineral is treated with hydrochloric acid, the iron oxidized by means of nitric acid, the phosphoric acid precipitated with a ferric salt, the mixture evaporated to dryness and the residue extracted with water. The resulting solution contains the alkaline chlorides, manganous chloride and some iron chloride. The manganese, etc., are removed with barium sulphide. The excess of barium is removed with sulphuric acid and filtration. The lithium carbonate is precipitated from the filtrate by means of sodium carbonate or carbon dioxide gas. For other useful literature on the manufacture of lithium carbonate see reference at end of this article.[4]

From the above information we can readily judge what impurities are likely to be met with in lithium carbonate, viz.: traces of the powdered mineral itself, any of the bases associated with the lithium and impurities introduced through the solvents or precipitants.

The 1890 U.S.P. describes lithium carbonate as a light, white powder, odorless, of an alkaline taste and reaction, and permanent in the air. It is soluble in 80 parts of water at 15° C. and 140 parts of boiling water, much more soluble in water impregnated with carbon dioxide gas, soluble in acids with active effervescence, insoluble in alcohol, fuses at a low red heat, and at a higher temperature is partially converted into the oxide, with evolution of carbon dioxide gas. One gramme treated with 40 c.c. of dilute acetic acid should produce a clear solution, separate portions of which should not be affected with solutions of *silver nitrate, hydrogen sulphide, barium chloride, ammonium oxalate, ammonium sulphide* or *sodium cobaltic nitrite.* The dried chloride from one half gramme of lithium carbonate should be completely soluble in 3 c.c. of absolute alcohol, and the addition of 3 c.c. of ether should not produce a turbidity. The salt should contain 98·98 per cent. of pure lithium

carbonate when titrated with normal sulphuric acid and methyl orange as indicator.

The *Arzneibuch für das Deutsche Reich*, 3d ed., 1895, contains almost the same requirements, but omits the rigid ammonium sulphide test.

The English Pharmacopœia of 1898 is somewhat less exacting.

An examination of the lithium carbonate available in the United States shows that not a single sample complies with the U.S.P. requirements. The results of the eight samples examined are contained in the table opposite:

Let us now examine the U.S.P. requirements seriatim. Lithium carbonate is a light, white powder, odorless, of an alkaline reaction and taste.

Sample number *one* differed materially from all the others in physical appearance; being bulkier, notably free from agglutination, and smooth and soft like starch. This difference is probably due to the method of manufacture. If lithium carbonate is prepared from lithium sulphate, by the use of potassium carbonate, a harsh, sandy powder is the result; but on dissolving the lithium carbonate thus formed, in hydrochloric acid, and then precipitating with ammonium carbonate, a beautiful voluminous product is the result. No. 1.

It will be noticed, under microscopical examination, that crystals are frequently present. This point ought to be noted in the description. These crystals are produced in several ways. On boiling a solution saturated with carbon dioxide gas; by spontaneous evaporation of a similar or other solutions; the lithium carbonate separates as prismatic crystals, or as crystalline crusts.

Lithium carbonate is soluble in 80 parts of water at 15° C., and in 140 parts of boiling water. Much more soluble in water impregnated with carbon dioxide. Soluble in acids, with active effervescence. Insoluble in alcohol.

The data on the solubility of this chemical are greatly at variance. P. Kremers[5] states that 100 parts of water at 13° C. dissolve 0·769 parts, while the same quantity at 102° C. dissolves 0·778 parts of the salt. L. Troast[6] says 100 parts of hot or cold water dissolve 1·2 parts of lithium carbonate. E. Schmidt,[7] 75 parts of water at 20° C. dissolve 1 part of the salt. C. N. Draper,[8] 100 parts of water will dissolve 1·4787 at 15° C., and 0·7162 at 100° C.

No.	Physical Appearance.	Microscopical Examination.	Per Cent. of Lithium Carbonate, Volumetrically.	Per Cent. of Lithium Carbonate, Gravimetrically.	Impurities.	Solubility at 15° C.	Remarks.
1 . . .	Excellent, smooth and uniform.	Some crystals, mostly amorphous.	96·20	98·63	Sulphates, chlorides, iron and calcium.	1–80 Slight residue.	Sulphates, excessive. Acetic acid solution, opalescent. Coloration with H_2S and $(NH_4)_2S$ solutions.
2 . . .	Fair, lumpy.	Amorphous.	98·42	97·70	Sulphates and chlorides	1–80 Slight residue.	Acetic acid solution, opalescent. Coloration with H_2S and $(NH_4)_2S$ solutions.
3 . . .	Fair, lumpy.	Amorphous.	98·79	100·00	Calcium and chlorides.	1–79 Slight residue.	Acetic acid solution, opalescent. Coloration with H_2S and $(NH_4)_2S$ solutions.
4 . .	Fair, lumpy.	Amorphous.	99·50	97·77	Chlorides.	1–76 Residue, trace.	Acetic acid solution, opalescent. Coloration with $(NH_4)_2S$ solution.
5 . . .	Excellent, lumpy.	Some crystals, mostly amorphous.	99·16	97·77	Sulphates and chlorides.	1–78 Slight residue.	Acetic acid solution, opalescent. Coloration with $(NH_4)_2S$ solution. Chlorides, excessive.
6 . . .	Fair, lumpy.	Amorphous.	99·13	—	Aluminum, sulphates, iron and calcium.	1–80 Slight residue.	Acetic acid solution, opalescent. Coloration with H_2S and $(NH_4)_2S$ solutions.
7 . . .	Fair, lumpy.	Amorphous.	98·63	—	Sulphates.	1–80 Slight residue.	Acetic acid solution, opalescent. Coloration with $(NH_4)_2S$ solution.
8 . . .	Fair, lumpy.	Some crystals, mostly amorphous.	97·50	—	Sulphates.	1–80 Slight residue	Acetic acid solution, opalescent. Coloration with $(NH_4)_2S$ solution.

J. Bewad,[9] 100 of water at 20° C. dissolve 1·329, and the same amount of water dissolves 0·796 parts or 0·955, according as the solution is boiled one-fourth or one-half hour. F. A. Flückiger,[1] and H. Selzer[11] confirm Bewad's results. By long spontaneous evaporation a solution can be obtained which contains 2 per cent. of lithium carbonate.

The results recorded in the above table on solubility were obtained by the digestion method. In every case there was present a small amount of insoluble residue even with 100 parts of water. The impurity also manifested itself on dissolving the chemical in dilute acetic acid or other acids. This is, without doubt, an accidental or incidental mechanical impurity, and should be taken into consideration when prescribing limitations.

One gramme of lithium carbonate required from 136 to 140 parts of boiling water for complete solution. The samples in each case were finely powdered, so that all lumpiness was eliminated.

The statement that the salt is soluble in dilute acids is somewhat sweeping. It might be well to state that lithium phosphate is somewhat insoluble and considerable excess of the phosphoric acid may be needed.

On cooling fused lithium carbonate, a crystalline mass results, which disintegrates into pearly particles. When the salt is heated to a high temperature, in the presence of air, the greater part of the carbonate is converted into the super oxide and the platinum crucible (if used) is attacked.

A glance at the columns headed Impurities and Remarks, of the preceding table, will render comments in this connection unnecessary.

The operation given in the Pharmacopœia for detecting excessive amounts of other alkalies, based on the solubility of a given amount of lithium chloride in absolute alcohol and ether, is rather impracticable. Absolute alcohol is very hygroscopic and lithium chloride is extremely deliquescent, making a combination that requires skill and apparatus to manage, so as to secure reliable results. The writer is of the opinion that this requirement could easily be dispensed with, without materially affecting the standard for this chemical. The solubilities, the flame test and the sodium cobaltic nitrite practically eliminate other alkalies. The test might be retained for information.

One gramme of pure lithium carbonate requires 27·0745 c.c. of normal acid for complete neutralization. The U.S.P. requires not less than 26·8 c.c. per gramme, corresponding to 98·98 per cent. of pure salt. According to the results in the preceding table the average of *thirteen* determinations of *eight* samples, *eight* volumetric and *five* gravimetric, is 98·4 per cent. Volumetric alone, 98·41 per cent. Eliminating the lowest volumetric result, we obtain 98·71 per cent. as the average of seven determinations of as many samples.

In the Digest of Criticisms on the U.S.P. of 1890 (1897), Part I, p. 103, we find the following: "One gramme carbonate of lithium requires for neutralization 27·745 c.c. normal sulphuric acid; Ph. Germ. III directs at least 26·8 c.c. acid for one gramme of the salt, corresponding to 96·59 per cent. of the pure carbonate, which is exactly the strength Curtman has found in all the specimens examined by him."

These figures are correctly quoted from Circ. No. 112, p. 676. There are, however, several errors in the circular. The number of cubic centimeters, 27·745, should read 27·0745, the cipher having been inadvertently omitted. 26·8 c.c. of normal sulphuric acid *do not* correspond to 96·59 per cent. of pure carbonate, but to 98·98 per cent., which is probably what was meant and is correct in the U.S.P.

98·98 per cent. is a trifle higher than the best average result obtained by the writer, viz.: 98·71 per cent. The writer is of the opinion that the mechanical impurities contribute largely towards lowering the per cent.

The volumetric and the gravimetric methods were carefully compared. The conclusion is decidedly in favor of the volumetric process.

According to the above data, Lithium Carbonate is a light, white powder, with occasional crystalline grains, odorless and having an alkaline taste; permanent in the air.

Soluble in not less than 75 parts, and should not require more than 80 parts of water at 15° C., and in 140 parts of boiling water; much more soluble in water impregnated with carbon dioxide; insoluble in alcohol. Soluble in dilute nitric, sulphuric, hydrochloric and acetic acids, with active effervescence.

Fuses at a low red heat; loses carbon dioxide at a higher temperature, and is partially converted into the oxide. It imparts a crimson color to a non-luminous flame.

The aqueous solution has an alkaline reaction upon litmus paper.

One gramme dissolved in 50 c.c. of dilute acetic acid should at most leave only a trace of insoluble matter (limit of *mechanical impurities*). Separate portions of this solution should not be affected by: hydrogen sulphide, T. S. (absence of *arsenic*, *lead*, etc.); ammonium oxalate, T. S. (absence of *calcium*), or sodium cobaltic nitrite, T. S. (limit of *potassium*); or produce more than a faint opalescence with silver nitrate T. S. (limit of *chloride*); barium chloride T. S. (limit of *sulphate*); or more than a slight coloration with ammonium sulphide T. S. (limit of *iron*, *manganese*, etc.).

If 0·5 gramme of Lithium Carbonate be dissolved in 2 c.c. of hydrochloric acid and the clear solution evaporated to dryness, the *dry* residue should dissolve completely in 3 c.c. of absolute alcohol, and 3 c.c. of ether added to this solution should not render it turbid (limit of *other alkalies*).

If 1 gramme of the dry salt be mixed with 25 c.c. of water, to which have been added a few drops of methyl-orange solution, it should require not less than 26·7 c.c. of normal sulphuric acid, corresponding to at least 98·61 per cent. of the pure salt.

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[3] 1855. *Ann. de chim. et de phys.*, 3, *45*, 350.

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1896. *Encyklopädisches Handbuch der Tecknischen Chemie*, by F. Stohmann and B. Kerl, Vierte Auflage, *5*, 774.

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[9] 1884. *Jour. der russ. phys.-chem. Ges.*, 1, 591; *Abts. Ber. d. chem. Ges.*, 17, 406.

[10] 1887. *Arch. der Pharm.*, (3), *25*, 509.

[11] 1885. *Arch. der Pharm.* (3), *23*, 591; Pharm. Ztg. No. 55.

35 Poplar Street, Philadelphia, Pa.

Rhus Poisoning may be treated successfully by an application of ammonium muriate: 1 ounce to be dissolved in two quarts of warm water. The solution is to be applied on cloth or absorbent cotton, covered with oil silk or rubber tissue. —A. T. Hudson, in *N. Y. Med. Rec.*

QUALITATIVE EXAMINATION OF POWDERED VEGETABLE DRUGS.

BY HENRY KRAEMER.

(*Concluded from No. 11, p. 573.*)

C. NO STARCH OR CRYSTALS OF CALCIUM OXALATE, BUT MASSES OR CRYSTALS OF A CARBOHYDRATE (INULIN).

The *Inulin* occurs in numerous irregular nearly transparent or grayish fragments, sometimes perfect sphere-crystals. These masses or crystals are soluble in hot water; insoluble in alcohol and glycerin.

368. *Inula.*—Grayish-brown masses from secretion reservoirs; few sklerenchyma fibres (15 μ wide); reticulated ducts 32 μ wide; odor and taste.

369. *Lappa.*—Apparent absence of secretion reservoirs; more wood fibres and possibly larger reticulated ducts (as much as 70 μ wide) than Inula; cells of periderm brownish, becoming yellow with age; parenchyma very light colored; no odor.

370. *Pyrethrum*—Characterized by a stone cork (30 x 45 μ) with yellowish-brown contents; few sklerenchyma fibres; narrow reticulated ducts about 15 μ wide; characteristic parenchyma; oil secretion reservoirs; taste.

371. *Taraxacum.*—Characteristic milk vessels in chloral-iodine mount. See No. 165.

IV. POSSESSING SECRETION HAIRS, CELLS OR RESERVOIRS AND OF SOMEWHAT CHARACTERISTIC ODOR.

A. SECRETION HAIRS.

372. *Anthemis.*—Non-secreting and secreting hairs; spherical prickly pollen grains (32 μ) which may not be numerous; papillæ of corolla and stigma; sklerenchyma fibres (10 μ wide) the walls of which are very much thickened; small rosette-shaped calcium oxalate crystals sometimes found; characteristic cells of anther.

373. *Arnicæ Flores.*—Numerous spherical prickly pollen grains (30 μ); secretion hairs; sklerenchyma fibres; characteristic non-secreting hairs of pappus (like top of pineapple fruit); outer portion of corolla and ovary.

374. *Belladonnæ Folia.*—See No. 46.

375. *Cusso.*—See No. 345.

376. *Lupulin.*—Large characteristic secretion hairs (20 x 20 μ). In *fresh* Lupulin more light yellow colored secretion hairs than in *old*. In latter there are, browner or grayish-brown resinous masses replacing the light yellow oil. The amount of *Humulus* fragments should not be too large in good quality. See No. 537.

377. *Santonica.*—See No. 350.

B. SECRETION CELLS OR RESERVOIRS.

378. *Aurantii Amari Cortex.*—See No. 206, crystals of calcium oxalate.

379. *Aurantii Dulcis Cortex.*—See No. 207, crystals of calcium oxalate.

380. *Inula.*—See No. 368, Inulin masses or crystals.

381. *Limonis Cortex.*—See No. 208, crystals of calcium oxalate.

382. *Macis.*—A peculiar starch (becomes red with iodine and called "dextrin starch") in small irregular particles; yellowish (oil) and reddish (resin) secretion cells (75 μ); few ducts; H_2SO_4 stains contents of secretion cells bright red; KOH stains contents of secretion cells a yellow. *Bombay mace* gives with H_2SO_4 a yellowish reaction; the oil secretion cells and "dextrin starch" grains are possibly larger; the epidermal cells are radially elongated and the collenchymatic layer underneath may be wanting in Bombay mace.

383. *Pyrethrum.*—Stone cork. See No. 370.

V. PRESENCE OF SKLERENCHYMA CELLS (STONE CELLS) OR FIBRES (BAST OR WOOD).

A. STONE CELLS.

384. *Aconiti Radix.*—Starch. See No. 319.

385. *Asclepias.*—Crystals and starch. See No. 242.

385a. *Black Mustard Hulls.*—Chiefly fragments of seed coat.

386. *Cocoa Shells.*—Little or no starch; oil globules; characteristic brownish adhesive fragments, possessing more or less hexagonal epidermal cells; peculiar small tabular mucilage cells and a layer of nearly isodiametric stone cells (10 x 10 μ) the walls of which are 4 μ thick.

387. *Canella alba.*—Crystals, starch, secretion reservoirs. See No. 244.

388. *Capsicum.*—Small starch grains might not be observed;

reddish-colored oily drops; peculiar wavy cells of seed coat besides stone cells of epicarp and endocarp; secretion hairs of calyx; powder with H_2SO_4 becomes purplish, changing to purplish-red.

389. *Cardamom.*—Starch and crystals. See No. 270.

390. *Clove Stem.*—The presence of stone cells distinguish it from cloves. See No. 347.

391. *Coffee.*—Oil, aleuron, starch and epidermis with spindle-shaped stone cells. See No. 324.

392. *Colchici Semen.*—Starch, oil and protein. See No. 326.

393. *Colocynthis.*—Stone cells (70 x 50 μ) of fruit, the walls of which are 15 μ thick; also find characteristic yellowish, nearly isodiametric stone cells of seed containing very thick walls and but little lumen; embryo contains oil and aleuron. The *amount of seed* in powder can be determined from the amount of oil in the form of globules. The U.S.P. directs only pulp, and not seeds or epicarp.

394. *Composition Powder.*—Tissues of ginger, cloves, capsicum and bayberry. See No. 245.

395. *Cubeba.*—Starch and secretion reservoirs. See No. 308.

396. *Delphinium.*—No starch; oil and protein; characteristic stone cells (32 x 175 μ) forming the inner epidermis and containing a reddish-brown coloring substance; also spatulate cells (outer epidermis of seed coat) with simple pores.

397. *Galla.*—Crystals and starch. See No 247.

398. *Guarana.*—Starch. See No. 328.

399. *Hicra Picra.*—Canella and aloes. See. No. 255.

400. *Illicium.*—Palisade sklerenchyma. See No. 356.

401. *Jalapa.*—Crystals and starch. See No. 250.

402. *Juglans.*—Crystals and oil. See No. 251.

403. *Pareira.*—Starch. See No. 329.

404. *Prunus Virginiana.*—Starch and crystals. See No. 282.

405. *Pulv. Jalapæ Comp.*—Jalapa and potassii bitartras. See No. 256.

406. *Quercus alba.*—Crystals and tannin. See No. 360.

407. *Pimenta.*—Crystals, starch and oil. See No. 254.

408. *Pyrethrum.*—Inulin and stone cork. See No. 370.

409. *Rumex crispus.*—Crystals and starch. See No. 260.

410. *Syr. Trifolii Comp.* (*Powder*).—Stillingia, Xanthoxylum fraxineum, Lappa, Phytolacca, Berberis aquifolium, Cascara amarga and red clover. See No. 263.

411. *Vanilla.*—No starch. See No. 363.

412. *Viburnum prunifolium.*—Crystals, more stone cells and fewer sklerenchyma fibres. See No. 265.

B. SKLERENCHYMA FIBRES.

413. *Althæa.*—Crystals, starch and mucilage. See No. 238.

414. *Anthemis.*—Pollen. See No. 372.

415. *Apocynum.*—Starch. See No. 320.

416. *Arnicæ Flores.*—Pollen. See No. 373.

417. *Aspidosperma.*—Crystals in crystal fibres. See No. 267.

418. *Belladonnæ Radix.*—Starch. See No. 298.

419. *Cardamom.*—Crystals and starch. See No. 270.

420. *Cascarilla.*—Crystals and starch. See No. 243.

421. *Cinchona.*—Characteristic bast fibres. See No. 299.

422. *Cinnamon.*—Starch, crystals and stone cells. See No. 292.

423. *Cloves.*—Few sklerenchyma fibres and numerous large secretion reservoirs. See No. 346.

424. *Clove Stems.*—Stone cells, numerous sklerenchyma fibres. See No. 347.

425. *Cubeba.*—Starch, oil, stone cells. See No. 308.

426. *Euonymus.*—Crystals and starch. See No. 246.

427. *Ext. Glycyrrhizæ.*—See No. 272.

428. *Ext. Sarsaparillæ Fld.* (Powder).—Tissues of sarsaparilla, glycyrrhiza, sassafras and mezereum. See No. 273.

429. *Frangula.*—Crystals, starch, but *no* stone cells. See No. 274.

430. *Gelsemium.*—Crystals and starch. See No. 275.

431. *Ginger, Charcoal and Magnesia.*—Tissues of ginger, willow charcoal and particles of MgO. See No. 277.

432. *Glycyrrhiza.*—Crystals and starch. See No. 276.

434. *Gossypii Rad. Cort.*—Crystals, starch and secretion reservoirs. See No. 249.

435. *Hydrangea.*—Crystals and starch. See No. 293.

436. *Illicium.*—Palisade sklerenchyma. See No. 356.

437. *Inula.*—See No. 368.

438. *Ipecac.*—Crystals and starch. See No. 294.

439. *Juglans.*—Crystals, oil and tannin. See No. 251.

440. *Krameria.*—Crystals, starch and coloring substance. See No. 279.

441. *Lappa.*—Inulin. See No. 369.

442. *Myrica Cerifera.*—Crystals in crystal fibres. See No. 252.

443. *Pareira.*—Starch and numerous stone cells. See No. 329.

444. *Phytolaccæ Radix.*—Crystals and starch. See No. 301.

445. *Podophyllum.*—Crystals and starch. See No. 332.

446. *Prunus Virginiana.*—Crystals and starch. See No. 282.

447. *Pulv. Aromaticus.*—Tissues of cinnamon, ginger, cardamom and nutmeg. See No. 295.

448. *Pulv. Glycyrrhizæ Comp.*—Tissues of glycyrrhiza and senna. See No. 283.

449. *Pulv. Ipecac. et Opii.*—Tissues of ipecac and opium; also crystals of sugar of milk. See No. 296.

450. *Pyrethrum.*—Inulin, stone cork. See No. 370.

451. *Quassia.*—Crystals. See No. 359.

452. *Quercus alba.*—Crystals and stone cells. See No. 360.

453. *Quillaja.*—Crystals and starch. See No. 284.

454. *Rubus.*—Crystals and starch. See No. 259.

455. *Rumex Crispus.*—Crystals, starch and stone cells. See No 260.

456. *Sabina.*—Starch and "hypodermis fibres." See No. 311.

457. *Sassafras.*—Starch, oil and tannin. See No. 313.

458. *Serpentaria.*—Starch. See No. 145.

459. *Stillingia.*—Crystals, starch and oil. See No. 262.

460. *Sumbul.*—Starch and oil. See No. 125.

461. *Syr. White Pine Comp.*—Tissues of wild cherry, Aralia spinosa, sassafras, sanguinaria, white pine bark and balm of gilead buds. See No. 285.

462. *Tr. Cinchonæ Comp.* (*Powder*).—Tissues of cinchona, bitter orange peel and serpentaria. See No. 303.

463. *Ulmus.*—Crystals, starch and mucilage. See No. 285.

464. *Viburnum opulus.*—Crystal fibres and sklerenchyma fibres. See Nos. 287 and 265.

465. *Willow Charcoal.*—In glycerin mounts, wine-colored or dark reddish or blackish irregular-shaped fragments containing wood fibres; transverse fragments with lumen.

466. *Xanthoxylum.*—Crystals, starch and oil. See No. 289.

VI. ABSENCE OF SKLERENCHYMA.

467. *Gentian.*—Yellowish oil globules; spiral (30 μ wide), and scalariform (50 μ wide) ducts; small colorless and yellow prismatic

crystals (which may be calcium oxalate crystals); large (5 x 15 μ) prismatic crystals separate in glycerin mounts which may be a sugar; characteristic "Ersatzfasern" accompanying the sieve.

VII. CHARACTERISTIC POLLEN GRAINS.

468. *Anthemis.*—See No. 372.

469. *Arnicæ Flores.*—See No. 373.

470. *Carthamus.*—Glycerin, of mount, colored yellow; numerous elliptical, prickly pollen grains, which are more or less elliptical (50 x 60 μ); brick-red secretion vessels; cells of anther; hairs of stigma; chaff or pappus.

471. *Caryophyllus.*—See No. 346.

472. *Crocus.*—Glycerin of mount colored deep orange; few nearly smooth, nearly spherical pollen grains (85–100 μ); papillæ of stigma; coloring principle soluble in water and not in fatty oils, being the reverse in *Capsicum;* with H_2SO_4 fragments become blue immediately.

473. *Rosa centifolia.*—Pollen grains nearly smooth and elliptical (17 x 30 μ); fragments of corolla pinkish with chloral; papillæ of corolla are somewhat rounded; cells of anther; long, 1-celled fibres around ovary and akenes being 875 μ long and 10 μ wide. In *Rosa gallica* the pollen grains are ovate (28 x 32 μ) rather than elliptical; the papillæ of corolla are acute rather than rounded; absence of many anthers or fibres of ovary.

474. *Sambucus.*—No starch; numerous smooth, nearly spherical pollen grains (18 x 18 μ); numerous fragments of broken or whole anthers; corolla with dentate papillæ; oil globules from secretion cells; in calyx some rosette-shaped crystals of calcium oxalate; in flower stalk large spiral ducts (30 μ wide), and parenchyma with brown contents.

475. *Santonica.* See No. 350.

VIII. LITTLE OR NO INDICATION OF PLANT TISSUES.

A. CONTAINING STARCH.

476. *Amylum Iodatum.*—See No. 335.

477. *Bryonia.*—See No. 336.

478. *Colchici Cormis.*—See No. 337.

479. *Ext. Glycyrrhizæ.*—Irregular, wine-colored fragments; al-

tered and unaltered starch grains; few fragments of bast and crystal fibres of glycyrrhiza; soluble in water and taste sweetish.

480. *Opium.*—Insoluble in water; taste bitter. See No. 338.

B. WITHOUT STARCH.

a. Particles of organized form.

481. *Corn Smut.*—Grayish-brown, nearly spherical spores (7 x 7 μ); little or no foreign substances. Spores of *Coprinus comatus*, blackish and elliptical (10 x 5 μ). Spores of *Agaricus campestris* more brownish than corn smut, are egg-shaped and in size about 5 x 7 μ.

b. Particles of inorganic form.

α. *Remain opaque* (*not affected*) *in glycerin.*

482. *Aloes* (*Socotrine*).—Partially unaffected. See No. 487.

483. *Benzoin.*—Colorless and wine-colored irregular fragments; some rosette-shaped groups and collection of small tetragonal or plates of crystals. Upon covering a fragment on a slide with a watch crystal and cautiously heating crystals of benzoic acid are sublimed on the watch crystal.

484. *Elaterium.*—Grayish and grayish-brown, more or less opaque and irregular fragments. Heat fragment with phenol, and when cool add H_2SO_4, a deep red coloration is produced. KOH has no action on elaterium.

485. *Goa Powder.*—Small, somewhat transparent, wine-colored, irregular angular fragments. With KOH a bright, reddish color produced.

(*β*). *Become more or less transparent in glycerin.*

486. *Aloes* (*Barbadoes*).—In a glycerin mount the particles become clear and behave like Cape aloes, but generally numerous acicular or large prismatic crystals remain or separate in clear yellow space where fragment of aloes was originally.

487. *Aloes* (*Socotrine*).—In a glycerin mount the fragment is not very perceptibly affected. At the most there is but a faint yellowish color around the grayish or grayish-brown masses. In old Socotrine aloes the gray masses look like rosette crystals.

488. *Catechu.*—Large opaque dark brownish-red masses which on the edge gradually become transparent and dissolve with a sherry wine color, also fragments of sklerenchyma.

489. *Kino.*—Fragments become clearer and a deeper red (port wine color) compared to catechu.

GROUP NO. 5. COLOR REDDISH.

Kino, Cochineal (black), Cochineal (gray), Lupulin (old), Macis, Myristica, Capsicum, Crocus, Carthamus, Santalum rubrum, Krameria, Sanguinaria, Pine shavings, Breakfast cocoa, Illicium, Sassafras, Lupulin (new), Rosa gallica, Pulv. Rhei. Comp., Hufland's Baby Powder.

I. ANIMAL FRAGMENTS (TEST BY BURNING).

490. *Cochineal.*—Carmine red color in mounts of glycerin or glycerin + chloral.

II. VEGETABLE FRAGMENTS.

A. CONTAINING STARCH.

a. Containing calcium oxalate crystals.

491. *Krameria.*—See No. 279.

492. *Hufland's Baby Powder.*—Fragments of Rheum, MgO and sugar. See No. 278.

493. *Pulv. Rhei. Comp.*—Fragments of Rheum, ginger and MgO. See No. 257.

b. Few or no Calcium oxalate crystals.

494. *Cocoa.*—See No. 386 and 545.

495. *Capsicum.*—See No. 306.

496. *Myristica.*—Starch grains (5–7 μ) generally in groups; numerous oil globules; parenchyma and "Hullperisperm," with reddish colored contents; in "Hullperisperm" some prismatic crystals; some tetragonal or prismatic crystals (5 x 10 μ) of myristic acid, which are soluble in KOH; heat powder in chloral get tabular or acicular crystals. Myristica distinguished from *Mace* in that latter has no starch, and on treatment with KOH the secretion cells of Mace are colored blood-red, whereas, Myristica becomes brownish.

497. *Sanguinaria.*—See No. 312.

498. *Sassafras.*—See No. 313.

B. WITH LITTLE OR NO STARCH.

a. Containing Calcium oxalate crystals.

499. *Cocoa.*—See No. 386 and 545.

500. *Illicium.*—See No. 356.

501. *Santalum rubrum.*—Hexagonal or coffin-shaped crystals (15 x 25 μ) in crystal fibres; long sklerenchyma fibres, 10 μ wide;

ducts (150 μ wide) with bordered pores; all cell walls colored yellowish-red; some cells contain reddish granular resin-like masses. Distinguished from other woods possessing red dye in only possessing one row of medullary ray cells (in hæmatoxylon the medullary rays are 4–5 cells in width) and coloring matter not dissolved by water.

III. NO VEGETABLE OR ANIMAL TISSUES.

502. *Kino.*—See No. 489.

GROUP No. 6. CONTAINING POWDERS THAT ARE RELATIVELY COARSE.

Sugar (granulated), Sago (imitation), Sago (real), Grits (corn), Corn Bran, Quillaja, Orris Root (Florentine), Viburnum opulus, Sarsaparilla (Mexican), Sarsaparilla (Honduras), Taraxacum, Mezereum, Strophanthus, Linum, Dulcamara, Sinapis nigra, Humulus, Matricaria, Triticum, Sassafras medulla, Sweet Orange Peel, Terebinthina, Manna, Canella alba, Colocynthus, Sambucus, Pepo, Amygdala dulcis, Amygdala amara, Berberis aquifolium, Asafetida, Myrrha, Gentian, Rheum, Frangula, Anise, Black Mustard Hulls, Cannabis Indica, Cardamom (seeds hulled), Syr. Trifol. Co., Arnicæ Flor., Chirata, Staphisagria, Cocculus, Zea (corn silk), Juniper, Coffee, Pix Burgundica, Confect. Rosæ, Rubus idæus, Lactucarium, Juglans, Mylabris, Rhus glabra, Hæmatoxylon, Chicory, Stramonii Semen, Tea, Cochineal (black), Cochineal (gray).

I. CONTAINING NUMEROUS VEGETABLE FRAGMENTS.

A. CONTAINING STARCH.

a. Containing crystals of calcium oxalate.

α. *Crystals rosette or star-shaped.*

503. *Canella alba.*—See No. 244.

504. *Frangula.*—See No. 274.

505. *Juglans.*—See No. 251.

506. *Rheum.*—See No. 215.

507. *Syr. Trifolii Comp.* (*Powder*).—See No. 263.

β. *Crystals cubical, tetragonal, prismatic or more or less coffin-shaped.*

508. *Berberis aquifolium.*—Crystals cubical (4 x 4 μ); starch in

single (2 x 2 to 5 x 7 μ) and 2 to 3-compound grains; libriform fibres 30 μ wide; all tissues light yellow and very hard and resistant.

509. *Cardamom.*—See No. 23.

510. *Frangula.*—See No. 274.

511. *Iris Florentina.*—Crystals either like in quillaja very long and 10–20 μ wide, or long needles; starch characteristic (15 x 30 to 15 x 15 μ); parenchyma; no cork; fibrovascular tissue.

512. *Juniperus.*—Crystals hexagonal (30 x 30 μ) in stone cells which are 60 x 60 and walls 15 μ thick; small amount of starch (5–7 μ); oil secretion reservoirs; brown pigment cells.

513. *Myristica.*—Crystals are of myristic acid. See No. 496.

514. *Quillaja.*—See No. 284.

515. *Syr. Trifolii Comp.*—See No. 263.

516. *Viburnum opulus.*—See No. 287.

γ. *Crystals acicular.*

517. *Cocculus.*—Crystals are soluble in alcohol and not in dilute acids. See No. 547.

518. *Iris Florentina.*—See No. 511.

519. Sarsaparilla.—See No. 40.

δ. *Crystals in fine sand* ("crystal sand").

520. *Dulcamara.*—Numerous starch grains (7 μ); ducts reticulated 55 μ wide or with bordered pores (35–45 μ) associated with libriform cells 4 μ thick; cork; all elements gray or yellowish-gray color.

(*b*) Containing starch but no calcium oxalate crystals.

521. *Chenopodium.*—See No. 108.

522. *Corn Bran.*—Less parenchyma containing characteristic grains of corn starch but more fragments of coat (bran); oil globules.

523. *Grits.*—More or less altered and unaltered starch grains; almost free from coat (bran); oil.

524. *Mezereum.*—Starch in single grains (7–10 μ) or in masses; numerous very long colorless bast fibres about 15 μ wide; light parenchyma; yellowish-brown or pinkish cork.

525. *Myristica.*—See No. 496.

526. *Orris Root.*—Starch of varying but rather characteristic shape (15 x 15 to 15 x 30 μ); may find tetragonal (20 μ wide) or acicular crystals; fibro-vascular bundles; no cork.

527. *Pepo.*—Few starch grains (2 x 2 to 3 x 4 μ) occur in outer epidermis and endosperm; characteristic, pear-shaped, thick-walled

(possessing simple pores) cells about 70 x 45 μ; yellow pigment cells of seed coat; oil and protein in embryo.

528. *Sago (True).*—Slowly affected by cold water when there separates the characteristic elliptical, or truncate-elliptical starch grains (15–20 μ).

529. *Sago (Imitation).*—Breaks down quickly in water and shows characteristic *corn starch* grains.

530. *Strophanthus.*—Starch grains (4 μ) characteristic; long non-secreting hairs (10 to 15 μ wide); narrow, almost colorless, collapsed cells and parenchyma containing starch, oil and aleuron; with H_2SO_4 should become green, indicating fresh and unimpaired strophanthus.

B. WITH LITTLE OR NO STARCH.

a. Animal tissues.—On burning fragment on platinum foil gives off odor of burning tissue.

(*a*) *Does not color glycerin.*

531. *Cantharis.*—Green metallic particles; not hairy.

532. *Mylabris.*—Very hairy.

(*β*.) *Gives a carmine-red color to glycerin.*

533. *Cochineal.*

(*b*) Without starch but containing vegetable tissues.

a. With Secreting or non-secreting Hairs.

534. *Anisum.*—See No. 8.

535. *Arnicæ Flores.*—See No. 373.

536. *Cannabis Indica.*—Characteristic crystoliths, with or without broad base attached, in latter $CaCO_3$ in a granular mass. Entire crystolith about 200 μ long; oil secretion hairs; rosette-shaped calcium oxalate crystals (20 μ); characteristic cells of pericarp.

537. *Humulus.*—Characteristic secreting hairs (Lupulin); numerous rosette-shaped calcium oxalate crystals (8 μ); non-secreting hairs; characteristic epidermis; ducts yellowish.

538. *Rhus glabra.*—Hairs may be numerous, long, broken, 1-celled or spatulate (consisting of a chain of cells), containing a red pigment dissolved; pigment cells; characteristic stone cells of pericarp (20 μ in diameter and walls 4–10 μ thick); oil and protein.

539. *Rubus idæus.*—Characteristic long, more or less curved, 1-celled hairs (7 μ diameter), containing a reddish pigment; loose parenchyma, containing pigment and rosette-shaped crystals of calcium oxalate (7 μ); also characteristic hairs of receptacle and calyx.

540. *Strophanthus.*—Starch grains might be overlooked as small grains and in small amount. See No. 530.

541. *Tea.*—Characteristic stone cells (idioblasts); numerous long, non-secreting hairs (10 μ wide); rosette-shaped crystals of calcium oxalate (10 μ); characteristic stomata (28 x 28 to 30 x 35 μ), with 4 or 5 "Nebenzellen"; adulterants are distinguished by possessing chiefly other forms of calcium oxalate crystals and hairs. (See also Mœller.)

β. *Sklerenchyma cells (i. e., stone cells).*

542. *Amygdala Amara* and
543. *Amygdala Dulcis.* } Characteristic lignified yellow epidermal cells (70 x 65 μ), the walls of which are 4 μ thick and possess simple pores; endosperm layer 15 x 15 μ; crystals, may be rosette-shaped or cubical, about 7 x 7 μ and occur near the ducts; or there may be acicular crystals, 40 μ long. Bitter almond distinguished by putting a few fragments in cold water for some hours, when odor of HCN develops; or take solution and add $(NH_4)_2S$, evaporate in a porcelain dish nearly to dryness, and add Fe_2Cl_6 = a deep blood-red color.

544. *Black Mustard Hulls.*—Consist chiefly of characteristic fragments of seed coat.

545. *Cocoa.*—Consists chiefly of protein grains and oil; starch grains 4–8 μ; fragments with brownish contents (cacao red); fat crystals in little prisms or needles; few fragments of seed coat, consisting of hexagonal epidermal cells, a peculiar mucilage layer of small tabular cells and a layer of nearly isodiametric stone cells (10 x 10 μ), whose walls are 4 μ thick.

546. *Cocoa Shells.*—Chiefly of fragments of seed coat. See No. 545.

547. *Cocculus.*—Characteristic reddish-brown pericarp with elongated stone cells of varying shape, but walls about 7 μ thick; crystals either needle-shaped (single or in groups about 35 μ long) or prismatic (10 x 100 μ long), soluble in alcohol, but not in acids.

548. *Coffee.*—Characteristic fragments of seed coat, consisting of altered parenchyma and spindle-shaped stone cells (35 μ wide and 175–200 μ long); most cells are those of endosperm, with thick (10 μ) porous brownish-colored walls, the contents are oil, aleuron and starch. In commerce coffee generally either "straight" or artificial. Latter consists of cereals, chicory, etc.

549. *Colocynthis.*—Stone cells of fruit, 70 x 50 μ, the walls of

which are 15 μ thick; characteristic, nearly isodiametric, thick-walled stone cells, with but small lumen; the cells of embryo contain oil and aleuron. The amount of seed in powder is determined by number of oil globules and fragments of seed coat. The U.S.P. directs only pulp, not seeds or epicarp.

550. *Cydonium.*—Without starch or calcium oxalate; characteristic seed coat consists of an outer layer of clear mucilage cells, as in linum, beneath these are cells with thick walls and contain a pigment reacting like tannin; parenchyma contains oil, protein and tannin.

551. *Linum.*—Numerous fragments, possessing characteristic tabular reddish-brown pigment cells; when seen in surface view (15 x 30 μ) associated with small yellowish-colored stone cells; mucilage layer prominent, being the outer epidermis; relatively thin-walled parenchyma, containing oil and aleuron.

552. *Pepo.*—See No. 527.

553. *Sinapis Alba* and 554. *Sinapis Nigra.* — No starch, tannin or crystallizable carbohydrate; mucilage layer not so prominent as in cydonium or linum; much oil and aleuron (latter in small grains); not infrequently find complete transverse sections of seed coat in the powder. In *Sinapis alba* the coat consists of hexagonal epidermal cells (45 μ); then follows a sub-epidermal collenchyma, a light yellowish or colorless pigment layer and a layer of stone cells (8 x 10 μ), the walls of which are 4 μ thick. In *Sinapis nigra* the unequal hexagonal epidermal cells are larger, 45–70 μ, the pigment layer is reddish-brown and stone cells are about as in Sinapis alba. Both mustards are turned blood-red in color by H_2SO_4. Likely to find fragments of turmeric in yellow mustard.

555. *Staphisagria.*—Characteristic fragments of seed coat with brown pigment and possessing prominent hexagonal stone cells (80 μ wide) with thick walls (20 μ); long spindle-shaped cells, such as occur in delphinium are present; parenchyma contains oil and aleuron.

556. *Stramonii Semen.*—Peculiar greenish fluorescence of mount

in glycerin or glycerin + chloral. Nothing behaves like this. Characteristic seed coat, with yellowish and brownish thick-walled stone cells; most characteristic are the groups (of train-like) brownish stone cells, whose walls are very thick, with scarcely any lumen sometimes; parenchyma contains oil and aleuron, but *no* starch.

γ. *sklerenchyma fibres.*

557. *Berberis aquifolium.*—Ducts (50 μ wide), with bordered pores, wood fibres (20 μ wide, walls 8 μ thick) and medullary rays (9 rows wide, containing starch grains 10 μ) are yellow; bast fibres 15 μ wide and walls 4 μ thick; cork prominent; parenchyma of cortex contains brownish-colored substance.

558. *Chicory.*—Inulin masses; characteristic cork; numerous fragments of ducts of varying size; parenchyma (25 x 140 μ); laticiferous vessels 7–20 μ wide.

559. *Chirata.*—No starch; pollen grains (4 x 10 to 7 x 10 μ); parenchyma large, with simple pores; spiral and scalariform ducts (30 μ wide); numerous sklerenchyma fibres (20 μ wide and walls 4 μ thick); yellowish epidermis with brownish-colored collenchyma beneath; seeds reticulate and in shape like hyoscyamus; mycelial-like development containing dark-brown-colored substance.

560. *Hæmatoxylon.*—Cubical crystals (20 μ) in crystal fibres associated with yellowish libriform fibres (15 μ wide and walls 4 μ thick); large ducts (140 μ wide) containing brownish masses; medullary rays are 4–5 cells wide; characteristic violet or purple coloration with alkalies; oil globules, resin and tannin masses.

561. *Matricaria.*—Numerous nearly spherical pollen grains (18–25 μ); fragments of corolla with secretion hairs; cells of anther; stigma with papillæ; peculiar ladder-like cells of wall of akene; sklerenchyma fibres of involucral scales.

562. *Pine Shavings.*—Characteristic tracheids with bordered pores.

363. *Taraxacum.*—Characteristic laticiferous vessels and inulin. See No. 165.

564. *Triticum.*—Without starch or calcium oxalate crystals; parenchyma containing irregular masses, soluble in water (sugar); yellow hypodermal cells with lignified thickening (walls 10 μ or more thick) and simple pores; three kinds of characteristic sklerenchyma of varying length and width; some of the fibres are marked here and there, apparently at regular intervals, with a tabular cell (duct) of same composition as fibre; ducts spiral and annular (30–50 μ in diameter).

β. Sklerenchyma cells or fibres wanting.

565. *Aurantii Amari Cortex.*—See No. 206.

566. *Aurantii Dulcis Cortex.*—See No. 207.

567. *Gentian.*—See No. 467.

568. *Limonis Cortex.*—See No. 208.

569. *Sambucus.*—Numerous smooth pollen grains (18 x 18 μ); cells of anther; sometimes find small crystals of calcium oxalate in calyx; fragments of corolla with characteristic slight, dentate, papillæ; in flower stalk are large spiral ducts (30 μ diameter); also parenchyma, with brown contents and collenchyma,

570. *Sassafras Medulla.*—Consists only of parenchyma cells, whose walls consist of cellulose and mucilage, and hence swell perceptibly in water. Mount sticky, mucilaginous.

571. *Taraxacum.*—Characteristic (not lignified) "Ersatzfasern," laticiferous vessels and inulin. See No. 165.

572. *Zea.*—Style with spiral and annular ducts, and from the epidermis there arises secretion hairs which are 300 μ long.

II. CONTAINING FEW FRAGMENTS OF TISSUES.

A. POSSESSING OIL.

573. *Asafetida.*—In a glycerin mount the powder shows irregular grayish (or gray streaked with brown) masses; opaque and becoming milky white on edge from oil. The *Stony* asafetida is pulverulent and contains less oil.

574. *Myrrh.*—In glycerin mount powder appears in yellowish or yellowish-brown irregular fragments made up of a grayish matrix and containing yellowish or yellowish-brown oil globules.

B. NO OIL; AND GLYCERIN MOUNTS NEARLY TRANSPARENT.

575. *Manna.*—Collection of long, transparent tetragonal or prismatic crystals of varying length and about 4 to 10 μ wide; fragments in glycerin leave clear crystal and little amorphous opaque residue.

576. *Pix Burgundica.*—More pulverulent (M. P. lower) than Terebinthina; lemon-yellow transparent, or grayish, somewhat translucent, more or less rounded and opaque masses. Soluble in glacial acetic acid, giving a yellowish-brown solution.

577. *Sugar.*—Like rock candy; dissolves in glycerin without residue.

578. *Terebinthina.*—More adhesive (softer in summer) than Pix Burgundica; nearly transparent colorless or light yellowish masses of irregular rounded outline. Solution in glacial acetic acid of a light yellow.

C. NO OIL, AND MOUNTS IN GLYCERIN MORE OR LESS OPAQUE.

579. *Confectio Rosæ.*—Fragments of red rose petals with characteristic more or less rounded papillæ; few elliptical pollen grains (18 x 32 μ); mass grayish and made up of rounded grains; some transparent sugar crystals.

580. *Lactucarium.*—Grayish brown and dark brown, irregular and rather angular masses; with alkalies they become reddish brown and then a dirty brown; with H_2SO_4, but slightly (faint yellow) affected.

NO. 7. VEGETABLE (ALSO ANIMAL) DRUGS WHICH DO NOT OCCUR IN POWDERS BUT IN MASSES OR LIQUIDS.

I. LIQUIDS.

581. *Balsam Peru*—Color blackish.
582. *Copaiba.*—Color amber.
583. *Gurjun Balsam.*—Color amber.
584. *Mel.*—Colorless or faint yellow.
585. *Styrax.*—Peculiar gray color.

II. SEMI-FLUID OR NEARLY SOLID.

586. *Bals. Tolu.*—Characteristic odor.
587. *Prunum.*—Characteristic tissues of pericarp and seed.
588. *Resina Podophylli.*
589. *Tamarindus.*—Characteristic tissues of pericarp and seed.

III. SOLID.

590. *Elastica.*—Not pulverulent.
591. *Resina Podophylli.*

REMARKS.

This investigation, which has occupied the attention of the author for several years, is based on the careful study of the crude (sometimes also fresh) drug as well as authentic commercial powders

(some of these have been furnished by Gilpin, Langdon & Co.) and in many instances drugs ground by the author.

In publishing these results at this time no one realizes more than the author that the whole scheme is but tentative and that additional study and the application of the method outlined will, no doubt, cause some changes to be made in practice. It would be surprising, furthermore, if there are not some errors of either commission or omission in that in some cases the characteristics given or withheld may be due to the examination of diseased, deteriorated or even spurious drugs. But all this is due to the fact that the collecting and caring for drugs is not carried out on scientific principles. Even should there be oversights or errors, the publication of this work must be of some value to pharmacognocists. We must realize that a communication of this kind to be complete in any sense must have incorporated with it the results and experiences of numerous investigators from rather widely scattered sections of the country and world.

The scheme is based on scientific principles, but it has been considered desirable at the outset to open up the subject by dividing the powders into groups depending on their color. It is true that color varies in the plant itself in nature and according to the time of gathering, mode of collecting and subsequent treatment, exposure to light, etc. But it is very necessary that these things be thoroughly studied before we are prepared economically to properly exhaust drugs, make preparations and pronounce on the therapeutical value of them. In this connection, it must be stated that in the study of powdered drugs the education of the eye to color is very important, and, indeed, necessary. Old and freshly-powdered drugs are to be distinguished by this means alone, as also a properly prepared drug from one carelessly treated. To the author's mind the eye and nose, and possibly the taste are very important factors in the study of powdered drugs in connection with the microscope.

A number of interesting features have been brought out in this investigation. In fact it opens up possibly an entirely new method in the study of our drugs at large.

(1) In the first place, in the color of the powder certain characteristic and diagnostic features are brought to light. Leaf and herb drugs in the powdered condition should be greenish or grayish, and not blackish or brownish-black; many roots and rhizomes ought to

be a light tan rather than a dark brown, etc. The value of Taraxacum and other more or less important drugs rich in reserve materials, as inulin, starch, etc., may be ascertained, as these reserve materials are contained, no doubt, in greatest abundance in the plant at the time that the active medicinal agents are present in likewise greatest amount.

(2) Certain facts, as the presence of pollen grains in Chestnut leaves will cause us to go into the woods and study the ecological and biological relations of the plants which yield us our drugs. For, without this study upon Nature herself, we shall never know what value to place upon such observations or their real significance.

(3) The presence of reserve starch in leaves and a diminution in calcium oxalate in any part of the plant where normally it is present, will cause us to open our eyes to the study of micro-organisms and inquire as to what these things have to do with the deterioration of drugs and the spoliation of medicinal preparations.

When these pharmacognostical problems are understood then we will cease to devote our energies to indiscriminately mixing certain things together in our attempts to make elegant pharmaceutical preparations, but will start out to know what causes the difficulty; and, knowing this, we know how to proceed intelligently and in a scientific manner, just as we proceed in certain chemical-pharmaceutical work.

(4) The use of the microscope in the examination of vegetable drugs (whether they be crude or powdered), as also in the examination of animal substances and chemical compounds, is an application of this instrument to a degree that this communication indicates—to some extent at least—the widest practical application. In fact, it opens up the necessity for making microscopical examinations and micro-chemical tests to a much greater degree than heretofore on the crude as well as powdered drug.

The author would impress again upon all investigators the necessity for accurate measurements of tissues and contents of materials which are studied; as also the name of the media or reagent in which the specimen lies or to which it has been subjected. KOH, chloral, glycerin, etc.—all of these have the property of affecting the thickness and character of the cell walls and cell contents, and it is upon these characteristics that we must rely for our useful studies of crude and powdered drugs.

EDITORIAL.

WAR REVENUE BILL.

It is more and more evident that the subject of taxation requires the undivided attention of statesmen and lawmakers possessed of unusual ability and judgment, and which have been accumulated by reason of large experience and opportunities for study. It is more apparent that party lines must cease on measures of such great economic importance as concern every citizen of the Republic. The tariff may be likened to a lock in a canal, which must be adjusted from time to time to meet the tide of necessity and nothing else. At certain times, as when the nation is at war, the supply from the upper canal must be in proportion to meet the outflow. The lock must be adjusted so that the income will meet the outgo. If necessity for the latter for any reason ceases (as when peace is declared), and the lock is not adjusted for the conditions existing, there must be an overflow. The overflow is as disastrous as the drought. The principle of "no tax except there be public necessity" is as immutable a law of this Republic as the declaration of Alexander Hamilton "that a complete power to procure a regular and adequate source of revenue, as far as the resources of the community will permit, may be regarded as an indispensable ingredient in every constitution."

We have already referred to the necessity of our Government providing means for an increased revenue, and to the precedent which was followed. No comment was made at that time, as we felt that whatever views we might have under the existing conditions, it was the duty of us all to stand by our country in its hour of need. Since that time conditions have changed. Peace negotiations are in progress, the war is virtually at an end, and "the excessive expenditures of the past few months must necessarily very speedily cease." In a report by A. Cressy Morrison, made at the recent meeting of the N. W. D. A., at St. Louis, in which the figures are based upon the official report of the Treasury Department we learn that: "The average normal expenditure for the years 1895, 1896 and 1897 was about $357,000,000 per year. This does not, of course, include the outlay of the postal service, which is about offset by the receipts from that source. It is fair to assume that this average yearly expenditure will be permanently increased, to a certain extent, by the results of the war. Suppose we estimate this permanent yearly increase at $43,000,000 (which is more than any believe it will be), you have a gross yearly expenditure of $400,000,000 to provide for.

"Now let us turn our attention to the receipts from taxation, and ascertain what revenue is coming in to meet this $400,000,000. We can only base our argument and suggestions upon the receipts for the first three months of the present fiscal year, viz., July, August and September, 1898. Taking these months, the showing is as follows:

FEDERAL REVENUE.

	1896.	1897.	1898.
Receipts from Customs	$12,157,330	$16,966,801	$15,169,680
(July) Internal Revenue	14,302,532	19,707,831	20,170,697
Miscellaneous	2,569,346	2,292,730	2,506,730
Receipts from Customs	12,329,495	6,987,702	16,240,600
(August) Internal Revenue	11,961,338	11,193,104	24,015,934
Miscellaneous	1,271,262	842,717	1,517,073

	1896.	1897.	1898
Receipts from Customs	$11,374,116	$7,943,100	$16,759,574
(September) Internal Revenue	11,679,136	12,701,975	21,555,283
Miscellaneous	1,530,991	1,288,022	1,463,207
The three months enumerated are those in which Government revenues are lightest. A careful examination and estimate, based upon comparisons of the receipts for July, August and September, 1898, with previous years, indicate that the monthly receipts from customs will be about $17,000,000, or for the fiscal year . .			204,000,000
From Internal Revenue, $24,000,000 per month, or for the fiscal year			288,000,000
From miscellaneous receipts, $2,000,000 per month, or for the fiscal year			24,000,000
Making a total revenue of			$516,000,000
Deducting from this the estimated expenditures for the fiscal year			400,000,000
And we have left a surplus revenue of .			$116,000,000

"Already the available cash balance in the Treasury has reached the enormous amount of over $300,000,000. The Secretary of the Treasury is put to his severest efforts to prevent such large withdrawals of currency from the channels of trade. The Spanish War gave him a chance to unload some of this surplus, to meet the emergency expenses, but that war is over, and soon all bills contracted therefor will be paid. There would seem to be no other course left open but a reduction of internal taxation. Among the subjects of taxation resorted to by the War Revenue law of 1898 there are several which will undoubtedly be permanently taxed, such as legacies and successions, sales of stock in Wall Street, the increased tax on beer and tobacco and one or two others. It therefore becomes a matter for your thoughtful consideration whether you should not make every possible exertion to get your stamp tax reduced, if not altogether repealed.

"The sudden termination of the war has not only left the Treasury with those enormous receipts from internal taxation, but the Secretary finds himself with $200,000,000 in cash realized from the sale of bonds, and this cash must, by the terms of the law, be applied to meeting the war expenses, and nothing else. He will, consequently, use these funds in preference to the receipts from taxation. This amount will be ample to cover the entire outlay requi ed, and an annual surplus of $116,000,000 will continue unchecked, unless Congress shall wisely repeal some portion of the war revenue law."

It would appear that the revenues of the Government by reason of the revenue bill and sale of bonds are more than are needed for the purposes for which they are intended. It is further apparent that the business of the pharmacist, particularly that of the retail druggist, is singled out from all other business interests in bearing this burden. He pays his share of the war expenses along with every other business concern by stamping their checks, telegrams, insurance policies, express receipts, legal instruments, etc., etc., and the special tax on medicines is just that much more than should be levied on the drug trade, and should be removed. There was no reason in the first place why manufacturers, of various protected articles, who are enabled by governmental

protection to secure extraordinary profits should not have contributed their share with the manufacturers of protected medicines. But the conditions as they prevail to-day should cause the absolute repeal of Section 20.

"Several weeks ago Commissioner Scott, according to *Bulletin of Pharmacy*, asked the collector of each district to make a careful observation of the workings of the tax and to send in his opinion concerning the changes which would make the act less burdensome and unjust, less hampering to business, and less provocative of friction and annoyance. The answers to this request will form the basis of the Commissioner's report to Congress, and Congress will, no doubt, be largely influenced by the Commissioner's findings." Now, if the stamp tax is to remain, it ought to be reconstructed, and that with justice to all business enterprises. "But why, forsooth, should it remain in existence? The policy of our country is against the imposition of any tax which is not warranted by public necessity." So great is the injustice of the present bill to the retail pharmacist and so perplexing are the interpretations of the local collectors and further confusing the rulings from the Washington Department, that the *Western Druggist* says: "The vexatious complications arising from the new war revenue act appear to be increasing in number daily, until it would seem that the retail druggist is veritably between the devil and the deep sea in his efforts to comply with the requirements of the law and at the same time save himself from being plundered to the point of bankruptcy." Let us hope that Congress will speedily reconstruct, at least, if not repeal, the law as relating to the retail druggist and manufacturer of medicines.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

A Text-Book of Chemistry. Intended for the use of pharmaceutical and medical students. By Samuel P. Sadtler, Ph.D., F.C.S., Professor of Chemistry in the Philadelphia College of Pharmacy; author of "A Hand-Book of Chemical Experimentation," "A Hand-Book of Industrial Organic Chemistry" and Chemical Editor of "The United States Dispensatory." And Henry Trimble, A.M., Ph.M., Professor of Analytical Chemistry in the Philadelphia College of Pharmacy; author of "Practical and Analytical Chemistry" and of a monograph on "The Tannins." Second revised and enlarged edition. In two volumes. Vol. II, Analytical Chemistry and Pharmaceutical Assaying. Philadelphia: J. B. Lippincott Company. London: 66 Henrietta Street, Covent Garden.

The handy volume of 336 pages before us is a material enlargement of Part V of the first edition of this work. Many subjects important to the operating scientific pharmacist which would have added considerably to the bulk of the one volume of the first edition, together with many valuable experimental details, are incorporated in the present book. The subject matter of this volume, which deals with analytical chemistry and pharmaceutical assaying, is divided into five parts.

Part I of sixty-five pages is an admirable, condensed treatise on the qualitative analysis of bases and acids, including some organic acids, *e. g.*, tartaric, benzoic, tannic acids, etc. This part is carried from the first edition with a few slight alterations or additions.

The uniform use of formulæ to express the names of reagents not only

effected much economy in space, but is also of value to students of this phase of the science. An excellent feature of this part of the book is seen in the analytical charts appended to each group of bases.

The second part, or quantitative analysis, covers 128 pages, and describes both gravimetric (68 pp.) and volumetric (60 pp) processes.

While the first edition by necessity (owing to the entire work being in one volume) contains only a few illustrative examples of gravimetric analyses, the present volume describes in detail the quantitative determination in simple salts of every basic and of the more important acid radicals touched upon in Part I. This selection is made with judicious reference to the needs of the pharmacist. Thus we find in the list bismuth, cerium, arsenic, mercury, hypophosphites, sulphites, cyanogen, silicates (seven pages), acetates, tartrates, citrates, etc. Often one substance is weighed in more than one form, *e. g.*, arsenic (in arsenic compounds) as $As_2 S_3$, and as ammonium magnesium arsenate, or bismuth in the form of Bi_2S_3, Bi_2O_3 and metallic Bi. The directions given in each case testify to the painstaking care of the authors.

Of course, no attempt is made to describe quantitative analysis of mixtures, although the assay of simple alloys and ores is considered. The authors (p. 73) properly suggest that the student should master the qualitative course of analysis in order to make himself able to personally devise some plan of quantitative separation, which is certainly a suggestion conducive to intelligent analytical operation.

In the part devoted to volumetric processes we find the most important test solutions enumerated, and their mode of preparation is also stated. The making of volumetric solutions is described, mostly in the language of the U. S. Pharmacopœia, and the several principles of volumetric assay are expounded in direct connection with the description of the volumetric solution which is used in the respective reactions.

Explanatory details are given in each case both regarding the reaction involved and the special experimental phenomena to be observed in the application of the assay under consideration. In this connection, for example, the treatise on Fehling's Solution (pp. 191-196) is a typical example.

Part III (61 pages) considers pharmaceutical assaying, and comprises the estimation of moisture and ash in organic drugs (pp. 204-207), alkaloidal assay by various methods (pp. 208-226), with special examples such as the assay of opium and its preparations, certain iron scale compounds, etc., as well as miscellaneous assays, such as the assay method of cantharides by Baudin, of pepsin, diastase, formaldehyde, etc.

In this part are furthermore considered gasometric estimations of the U.S. Pharmacopœia, the determination of some physical constants such as specific gravity, solubility, melting and boiling points, optical rotation ; the quantitative determination of the alcoholic strength of spirits, the acidity, extractive and ash of certain fluids, and the determination of glycerin in aqueous and alcoholic liquids, including the method of Benedikt and Zsigmondy.

Part IV gives in twenty-seven pages a useful treatise on the analysis of urine and urinary calculi, including the testing for albumen (272-276), sugar (278-285), etc., etc.

Part V in twenty-eight pages, treats of special processes, such as water analysis (289-304), milk analysis (305-308), and the estimation of nitrogen.

An appendix contains a table of atomic weights, Squibb's alcohol table and the pharmacopœial rules for reducing the percentage of alcohol to any given strength by admixture of water.

The book is clean and free from typographical errors, but on p. 71 the change of the reference, "page 859," was overlooked, and on page 177 the various sub-headings, which treat of the employment of volumetric solution of potassium permanganate might be made more conspicuous.

A well compiled index of eighteen pages adds to the ready usefulness of the book.

To sum up, Volume II now before us as might be expected from the hands of Professors Sadtler and Trimble, is a well-poised and admirable treatise on Analytical Chemistry and Pharmaceutical Assaying.

Any student in pharmacy, whether a beginner or experienced in that art, may follow it with confidence and profit. Results of personal experimentation and details of manipulation are not often recorded in text-books with the faithfulness and exactness we find in this volume. We commend the work as one that should be on the shelf of every assayist involved in pharmaceutical determinations.

JOHN URI LLOYD.

COMMERCIAL ORGANIC ANALYSIS. By Alfred H. Allen. Third edition, with revisions and addenda, by the author and Henry Leffman, M.D., Vol. I. Alcohols, neutral alcoholic derivatives, sugars, starch and its isomers, vegetable acids, etc. Philadelphia: P. Blakiston, Son & Co. 1898.

For the practical working chemist to whom the miscellaneous problems of commercial analysis are presented from day to day under a variety of forms, it is safe to say no work has proven of equal value with "Allen's Commercial Organic Analysis," and it is therefore certain to find a place on his reference shelf. The immense field covered in the plan has made it necessary to spread the work over four volumes, of which the third appeared in three parts, and as the author says in the preface to Volume IV, which has just appeared, "the production of the second edition of my 'Commercial Organic Analysis' has extended over fourteen years." So it happens that the second edition of this Volume I appeared in 1885, and has been out of print for several years. For this new edition Mr. Allen has furnished some new material, and Dr. Leffman, the American editor, has supplied still more.

Thus, under the subject of specific gravity, Dr. Leffman has introduced the Squibb specific gravity bottle in its latest form, and added a foot note, explaining the difference in graduation of the Baumé hydrometer in England and in America, which is very helpful. With his complaint of the want of accuracy of the Westphal balance and inability to obtain satisfactory results with it, however, the writer is not able to agree, as for many volatile liquids it can be made to give more reliable results than any other form of apparatus.

Considerable use has been made of the published processes of the American Association of Official Agricultural Chemists, and much valuable information taken therefrom. Thus, the very complete discussion of the Kjeldahl process, the determination of fusel oil in spirits, the applications of polarimetry in urine analysis, and the examination of starch and glucose products are all valuable additions from this source.

The improved method for the determination of acetone, by Kebler, is given,

but under chloroform the only mention of acetone as a present commercial source of chloroform production is given in one line of a foot-note. On a later page (p. 235) the preparation of chloroform from wood spirit is spoken of with no intimation that it is the acetone in this and not the methyl alcohol that is responsible for any chloroform produced. Similarly, under iodoform, no mention is made of its later modes of production, such as from acetone, and direct from iodides with the aid of electrolysis.

The section on cellulose is in general satisfactory, as its recognition in woody tissue is well discussed, and its derivatives of the nitrate class are described, but we notice that no mention is made of Cross and Bevan's important work on the production of soluble forms of cellulose, such as viscose and similar substances.

Mention is made of the nature of celluloid and gun cotton, and the method of their analysis, but no account of the newer smokeless powders, or their composition and analysis is given. This would have added to the completeness of this section.

However, the work as a whole is so valuable and comprehensive that small deficiencies should not weigh too greatly. It is emphatically a useful book, and will undoubtedly maintain its foremost rank as a reference book for many years to come.

S. P. S.

MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, November 15, 1898.

The meeting was called to order at 3 P.M., promptly, Mr. James T. Shinn acting as chairman.

The first paper read by Mr. W. L. Cliffe, Ph.G., upon "Product Patents from a Pharmaceutical Standpoint" (see page 596). Mr. Cliffe spoke of four classes of patents, obtainable in this country, *i.e.*, a patent for an art, machine, manufacture or composition of matter. Of these, the latter is the one considered by him at length, although he spoke of process patents also. Mr. Cliffe mentioned the acuteness displayed by German manufacturers who obtain product patents whenever possible; thus enabling them to reap tremendous profits from the sale of their products. Mentioning phenacetine as an example, the speaker stated that the cost of manufacture is about 10 cents per ounce, the selling price to the trade here being $1 per ounce. As the quantity sold in this country probably averaged 300,000 ounces per year during the life of the patent, the profits realized were enormous. Antipyrine was also mentioned as a notable example of the same injustice to American pharmacists.

In the discussion which followed Mr. Jos. W. England read an abstract from an editorial in the *Bulletin of Pharmacy* for October, which corroborated Mr. Cliffe's paper in many respects. Mr. Procter asked about the manner of importation, and was answered by Mr. Cliffe to the effect that it was not imported under the name, Phenacetine, and he did not know under what head it came in; an ad valorem duty on its cost of manufacture is imposed, which does not amount to much when compared with the selling price. Upon motion the author was thanked for his valuable paper, which was referred to the Committee on Publications.

Mr. England then read the following resolutions which he wished the members to consider:

WHEREAS, The United States Constitution, framed over a century ago, at a time when even the wonderful prescience of its makers could not have foreseen the conditions existing to-day, permits through Congress not only the patenting of processes for making remedial chemical compounds, but also the patenting of the compounds themselves, by citizens and aliens alike; and

WHEREAS, This privilege of patenting products intended to encourage invention and develop native industries by affording a term-limited monopoly in the articles made and sold, has been seized upon by foreign manufacturers as a means of securing the exclusive sale of such products in the American markets—no native industry being developed, no native labor being employed—and at prices for the goods wholly out of proportion to their real worth and far in excess of those demanded in other countries; and

WHEREAS, This privilege is used alone to the advantage of foreign interests, and to the detriment of the American public and its interests; therefore, the Philadelphia College of Pharmacy in Pharmaceutical Meeting assembled,

Resolved, That we protest against the further granting of such a monopolistic privilege—not permitted in Germany, France or England—as one opposed to the genius of our patent laws and the interests of our people; and

Resolved, That we earnestly urge the members of the Patent Commission appointed by the President under Act of Congress Number 121, approved June 4, 1898—whose duty it is to submit to Congress, a report indicating ' Any proposed changes in the substance of the existing law ;" the report to "be accompanied by notes which shall briefly and clearly state the reasons for proposed change"—to recommend that the privilege of patenting remedial chemical compounds be repealed, and, also, the practice of the United States Patent Office of copyrighting and registering for all time as the exclusive property of manufacturers, single names of compounds which by use become titles.

In the discussion which followed the reading of these resolutions Messrs. Boring, Lowe, Cliffe, Procter, McIntyre and England participated. Mr. England stated that it was his object to have the resolutions adopted and a copy forwarded to the Committee, who are now engaged in considering the revision of our patent laws, and who are to report to President McKinley in the near future. The resolutions were finally adopted as read, and a copy ordered to be sent as proposed. Mr. England made a motion, which was seconded and carried, that a copy of Mr. Cliffe's paper should accompany the resolutions sent to the Committee.

Mr. L. F. Kebler read a paper on "Medicinal Lithium Carbonate," which was offered as a contribution from the "Pharmacopœial Research Committee of the P.C.P." The paper was very interesting, and will be found in full in this JOURNAL (see page 600). The discussion which followed the reading was participated in by Messrs. Thompson, Shinn, Moerk and England.

Mr. Frederick L. Lewton then gave a talk upon Quebracho and its uses, which was of great interest, owing to the speaker's familiarity with the different aspects of his subject. His talk was illustrated by specimens from the Philadelphia Commercial Museums with which Mr. Lewton is connected. The paper will be published in a later issue of this JOURNAL. The following took part in the discussion : Messrs. Shinn, Haussmann, England, Lowe and Kebler.

The next paper was by Mr. Kebler, upon "Crystals of Sodium Chloride in Fld. Ext. Yerba Reuma, together with a proximate analysis of the plant." The paper will be published in full in a subsequent number of this JOURNAL. It proved very interesting and elicited quite a little discussion, to which Professors Remington and Moerk, and Messrs. Kebler and England contributed much information. Professor Remington, speaking with reference to the high ash content of the plant, which included 17 per cent. of sodium chloride, mentioned an experience of Dr. Squibb's in using a weak percolate repeatedly in manufacturing F. Ext. Valerian, and which finally became super-saturated with sugar,

which occurs in small proportion in the drug, so that a lot of the Fld. Extract which went out, deposited the sugar in crystals on the sides and bottom of the containers, causing complaints which mystified the operators until the cause was ascertained. Professor Remington also called attention to the occurrence of potassium nitrate in F. Ext. Henbane and potassium chloride in F. Ext. Belladonna occasionally.

The program for the afternoon was concluded by Professor Ryan, who gave a talk upon gelatine pearls and their manufacture. He exhibited the sheet of gelatine containing the filled pearls not yet cut apart, and also the perforated sheet from which the pearls had been cut out.

He spoke of the comparatively recent introduction of their manufacture into this country, and stated that the machinery employed was very expensive. The difference between a pearl and a capsule is that the former contains no air space and the latter does. They are made by pressing two sheets of gelatine together after having placed them on metallic plates having hemispherical depressions. The medicament is placed in the depressions on one of the sheets, which is held horizontally. The other is then pressed down upon it, having the depressions in perfect juxtaposition, so that their edges meet on both sheets. By the action of powerful presses the excess of medicament is forced out and the pressure seals the edges of the depressions on the two sheets, so they may be cut apart, forming the well-known pearls of commerce. Professor Ryan received much applause and was heartily thanked for his talk and exhibition of specimens.

Professor Lowe spoke of the peculiar leaf scars which he had referred to in an article in the AMERICAN JOURNAL OF PHARMACY for April, 1896, and which had been exhibited to the members at that time. He exhibited an additional lot, and stated that they were from white poplar.

Mr. Shinn asked whether all trees of this species showed this remarkable effect, which Professor Lowe could not answer with certainty.

Mr. Wallace Procter then spoke of the preservation of certain easily decomposable chemical salts, such as ammonium carbonate and unslaked lime, and said that he would recommend the use of Millville fruit jars of ½-gallon size for the purpose, as in his experience they had proven very satisfactory. Dr. Weidemann corroborated this from his own experience.

Mr. F. W. E. Stedem then asked whether the members present were accustomed to dispensing the red or straw-colored Elixir Curacoa upon prescriptions. Several members stated they used the N. F. preparation, which is the straw-colored one. Mr. Procter said he used Mr. Shinn's process for preparing the elixir by distilling spirits with the volatile oils of the aromatics used in its preparation.

Mr. Shinn stated that the process had been obtained by him from a French pharmacist, many years ago, who stated it to be the process for the genuine "Curacoa Cordial."

Mr. E. M. Boring spoke of some difficulties he had experienced in dissolving boroglyceride, after which the meeting adjourned.

The meeting was very well attended by many prominent members of the pharmaceutical profession and most of the Faculty.

CHARLES H. LAWALL,
Secretary pro tem.

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